



D3.1 - Diagnosis and baseline for all the demo sites

WP3, Task 3.1, Task 3.2, Task 3.3, Task3.4, Task3.5

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Abbreviations and acronyms

Acronym	Description
AFUR	Assessment Framework for Urban Regeneration
AFOLU	Agriculture, Forestry, and Other Land Use; including NBS
NBS	Nature Based Solutions
RGTR	Régime général des transports routiers
AFEDI	Association Francophone Européenne des Diagnostics, Interventions et Résultats Infirmiers
POL	Plan de Ordenación del Litoral
AERs	Annual Environmental Reports
BAP	Biodiversity Action Plan
BAU	Business as Usual
BEI	Baseline Emissions Inventory
BER	Building Energy Rating
CAP	Climate Action Plan
CCGT	Combined Cycle Gas Turbine
CIBSE	Chartered Institution of Building Services Engineers
CRU	Commission for Regulation of Utilities
CSO	Central Statistics Office
DCC	Dublin City Council
DCU	Dublin City University
DECC	Department of the Environment, Climate and Communication
DLA	Dublin Local Authority
DREM	Dublin Region Energy Masterplan

DZ	Decarbonising Zone
EPA	Environmental Protection Agency
EU	European Union
EV	Electric Vehicle
GDA	Greater Dublin Area
GHG	Greenhouse Gas
HP	Heat Pump
KPI	Key Performance Indicator
M&R	Monitoring and Reporting
NTA	National Transport Authority
OSM	Open Street Map
PRTR	Pollutant Release and Transfer Register
PV	Photovoltaics
SEAI	Sustainable Energy Authority of Ireland
SEC	Sustainable Energy Communities
tCO ₂	Tonnes of Carbon Dioxide
tCO _{2e}	Tonnes of Carbon Dioxide Equivalent

Executive Summary

The REGEN project is a comprehensive initiative aimed at fostering urban regeneration across multiple European demo sites, each with unique distinct territorial characteristics and intervention areas. This document serves as a critical deliverable within the project, offering a detailed overview of the project's scope and baseline Key Performance Indicators (KPIs) for each site. The primary objective of the REGEN project is to enhance urban sustainability, liveability, and resilience through targeted interventions and strategic planning.

The introduction outlines the various domains of urban regeneration addressed by the REGEN project, setting the stage for the detailed analyses that follow. This analysis aims to be an in-depth evaluation of the situation of each of the demo areas and their territorial context. Each demo has a different character, and this evaluation sets the scene for subsequent urban regeneration strategies.

The four demo sites are analysed within their respective territorial contexts, with each context adapted to the size of the demo case. These include the Canton of Redange in northwest Luxembourg for Beckerich, Laredo for La Puebla Vieja, the Giambellino-Lorenteggio neighbourhood in Milan for the smaller demo area on Via Giaggioli, and Dublin for the Ringsend and Poolbeg DZ area.

Once the territorial context is established, the document's section on the intervention area provides a detailed description of each demo site's physical and socio-economic characteristics. It covers the building stock, including typologies, construction years, and energy retrofitting aspects, as well as public space and urban accessibility, highlighting types of public spaces, green infrastructure, and mobility challenges. Additionally, it examines infrastructures and services, such as ICT availability, public and private services, and economic activities. The socio-economic characterization includes residents' profiles, demographic trends, and economic data, alongside citizen and stakeholder engagement, identifying key stakeholders, past initiatives, and local interests relevant to the REGEN interventions.

The REGEN approach ensures alignment with existing policies, regulations, or initiatives. This alignment is crucial for maintaining coherence with local and regional frameworks, thereby enhancing the project's effectiveness and sustainability. The results of this deliverable include a comprehensive set of baseline KPIs for each demo site, providing a clear starting point for achieving the project's objectives.

Overall, this document serves as a foundational reference for understanding the REGEN project's strategies and anticipated impacts across its diverse demo sites, offering valuable insights into the transformative potential of urban regeneration.

Keywords

Urban regeneration, neighbourhoods, sustainability, liveability, and resilience

1 Domain of urban regeneration addressed in REGEN project.

The REGEN project aims to pave the way for sustainable and lasting people-centric neighbourhood regeneration. To achieve this, a comprehensive catalogue of urban regeneration interventions has been developed (T2.1) in collaboration with all partners and piloting demo sites. This catalogue aligns with the Assessment Framework for Urban Regeneration indicators (AFUR indicators T2.5), NBenefit\$, and EU policies. It defines six distinct domains of intervention, with a transversal domain integrated into all others.

This structure ensures a holistic approach to urban regeneration, addressing the following domains:

- **Built Environment:** Focuses on the physical structure of urban areas, including buildings, public spaces, and infrastructure.
- **Energy Systems:** Involves planning, developing, and managing energy infrastructure, such as renewable energy sources, energy efficiency, and smart grids.
- **Mobility and Transport:** Addresses the movement of people and goods within urban areas, including transportation systems, pedestrian and cycling infrastructure, and urban logistics.
- **Circular Economy:** Aims to reduce waste and promote sustainable consumption and production patterns, including waste management, recycling, and sustainable procurement.
- **AFOLU (Agriculture, Forestry, and Other Land Use; including NBS):** Focuses on the sustainable management of land use, including agriculture, forestry, and conservation, as well as integrating nature-based solutions (NBS) like green infrastructure and ecosystem restoration.
- **Green Industry:** Involves developing and promoting sustainable industries, including eco-friendly manufacturing, sustainable tourism, and clean technologies.
- **Social Inclusion and Community Development:** Focuses on the social aspects of urban regeneration, including community engagement, social cohesion, affordable housing, public health, and education.

2 Beckerich demo site

Beckerich is a small commune (*The Principle of Communes in Luxembourg*, n.d.) (lowest administrative unit) in Luxembourg, located in the Canton of Redange (*Luxembourg's Territory*, 2024), and is known for its rich cultural heritage and commitment to sustainability. It comprises 8 villages and is governed by a local council and a mayor. Being a small town, there is often an overlap between territorial and local aspects, especially in terms of social and civic engagement.

2.1 Territorial characterization

2.1.1 Physical characterization

The Municipality of Beckerich, along with Groussbus-Wal, Rambrouch, Saeul, Vichten, Ell, Préitzerdaul, Redange, and Useldange, belongs to the Canton of Redange in northwest Luxembourg. It borders the cantons of Wiltz to the north, Diekirch and Mersch to the east, Capellen to the south, and Belgium to the west. It has an Area of 28,41 km² and it is at an altitude of 257 – 422m.

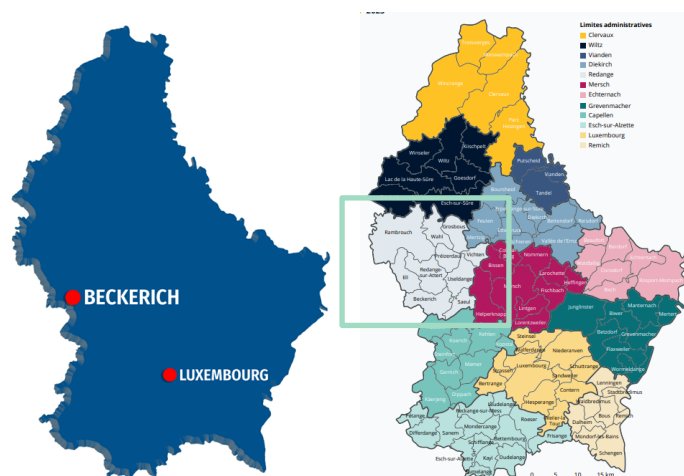


Figure 1 – Map: The 12 cantons of Luxembourg.

The canton is situated at the border of two main landscapes of Luxembourg. To the north, the landscape is dominated by the Oesling mountain range, part of the greater Ardennes region, characterized by densely forested hills with an average altitude of 400 to 500 meters above sea level, with the highest point being Napoléonsgaard at 554 meters. This region also features deep valleys carved by rivers and streams, notably the Sauer and Wark. The upper Sûre lake reservoir partly lies within the Canton of Redange, at the border with the Canton of Wiltz. To the south, the landscape is dominated by the Gutland plain, characterized by lower altitudes, averaging around 300 meters above sea level, with wide shallow river valleys and less forest.

coverage than in the north. The most important river in this region is the Attert.

The Canton of Redange covers an area of 267.5 km² (103.3 sq. mi), making it the second largest in the country. Despite its size, the canton is not connected to the national railway network. However, it is linked by various national roads, such as the N12 between Luxembourg City and Wiltz, and between Arlon (Belgium) and Ettelbruck. Additionally, the canton is served by an extensive public bus network, part of the Régime général des transports routiers (RGTR).

2.1.2 Socio-economic characterization

► Socio-economic profile

The population (2024) of the canton amounts to 21,138 inhabitants, ranking 9th of 12 cantons in the country. The density of the population is 79/km² (200/sq. mi), with the same national rank. The canton has a rural character. The only major town with more than 1'000 inhabitants is Redange-sur-Attert, the capital of the canton. Most infrastructure is therefore concentrated around the capital. Here a secondary school, supermarkets and a retirement home can be found. Furthermore, there is a high concentration of gas stations linked to fuel tourism along the border with Belgium, in towns such as Haut-Martelange and Oberpallen.

► Regional stakeholders

An intercommunal syndicate is a public establishment of intercommunal cooperation that associates the communes in terms of works or services of intercommunal interest. The municipality of Beckerich is a member of the following intercommunal syndicates that operate in the Canton de Redange: [Association des communes de la Vallée de l'Attert belgo-luxembourgeoise, Canton de Redange](#). (As a member of the Syndicat de Réidener Kanton, the municipality of Beckerich collaborates with nine other municipalities in the region. Common projects have been set up, such as the crèche in Reichlange and the new foyer for the elderly in Redange), [Office National du Tourisme](#), Ekodaul, [Leader, D'Millen asbl](#), [Transports publics](#), [Klimabündnis](#), [Kannerbetreuung Redange/Attert](#), [Croix-Rouge](#), [SIGI](#), [Ala](#), [SICONA-Centre](#), [SYVICOL](#), [SIDERO](#), [SICEC](#), [SIDECE](#), [Réidener Jugendhaus](#), [Ecole de musique Redange](#), [Club Senior Atertdall](#), [Réidener Schwämm](#), [Sécurité routière](#), [Klimateam](#), [Maison de l'Eau de l'Attert](#), [Parc Naturel de la Vallée de l'Attert](#) and [Réidener Energieatelier](#).

► Mobility & accessibility

In Beckerich, public transport is well-developed, with several bus lines connecting the municipality to Luxembourg City, Redange, Ettelbruck, and

Arlon, among other places. School bus services are also available, ensuring students can travel to various educational institutions. Additionally, the Bummelbus service offers on-demand transport for short journeys within the municipality and neighbouring areas, catering to both adults and children for various activities.

Cycling infrastructure has been significantly improved, with Beckerich being well-connected to Redange, Steinfort, and Useldange. A detailed cycling map is available, and three tourist circuits have been marked out to encourage cycling. However, the municipality still faces challenges in promoting cycling as a regular mode of transport among residents.

Carpooling is encouraged through the Klaxit app, which connects drivers and passengers, allowing for flexible scheduling and real-time tracking. This initiative aims to reduce individual car usage and promote shared journeys.

For electric vehicle users, Beckerich provides four charging points, supporting the transition to more sustainable modes of transport, i.e. electrified mobility.

In terms of individual habits, it is not always easy to encourage change. For instance, in the national action for using a bike, the municipality is typically one of the lowest-scoring ones in the country.

2.2 Intervention area

Located in the west of the Grand Duchy of Luxembourg and touching the Belgian border, the municipality of Beckerich is bordered to the south by a chain of hills. It comprises 8 towns (Beckerich, Elvange, Hovelange, Huttange, Levelange, Noerdange, Oberpallen, Schweich). The municipality is characterised by a slightly uneven landscape, with, in the distance, the heights of the Oesling. The large, wooded areas are home to unspoiled nature. The Beckerich municipality is essentially an open, agricultural landscape, crossed from west to east by the Route Nationale 24 linking Oberpallen to Useldange. In the past, it was crossed by the old railroad line between Noerdange and Martelange. Its special features are the production of water at the Eaux Minérales de Beckerich site and its resolutely ecological energy policy, which has been in place for many years.

2.2.1 Physical characterization

2.2.1.1 Building stock

The characterization of the existing building stock is provided in Table 1.

Table 1 – Number of buildings per period. Source: Klima Agence.

Construction year	total
1919	898
1945	83
1960	14
1970	5
1980	84
1990	65
2000	147
2005	7
2010	80
2015	107
2021	48
TOTAL	1538

Figure 2 shows the buildings in the Beckerich municipality, coloured by their period of construction. It additionally shows the trace of the district heating network (in red).



Figure 2 – Map: Buildings/construction period and the District Heating Network

In the Table 2, the number of buildings is provided for each village, per building type, showing a predominant share of single family buildings.

Table 2 – Number of buildings in the municipality, per type (data 2023)

		Oberpallen	Levelange	Beckerich	Huttange	Noerdange	Hovelange	Elvange	Schweich	Total
1	Agricultural buildings	17	12	13	10	11	5	15	10	93
2	Office buildings	5	0	4	0	4	1	1	0	15
3	Industrial / commercial buildings	1	0	2	0	10	4	1	1	19
4	Single-family homes	146	41	296	8	191	132	35	98	947
5	Multi-family houses	5	1	14	2	8	1	3	3	37
6	Listed buildings	1	3	6	0	1	4	3	3	21

► Heritage protection

The town is a notable cultural asset, featuring the beautifully restored old mill, “d 'Millen” which serves as a museum, art gallery, and restaurant. The town faces challenges such as maintaining its historic buildings (21 listed buildings) and adapting to a changing population.

► Energy supply, consuming and retrofitting characterization.

Beckerich is recognized for its renewable energy utilization, meeting about 85% of its energy needs through alternative sources. The municipality has been a trailblazer in Luxembourg in terms of climate action for many years, the turning point being the joining of the Climate Alliance in 1995. Sustainable development has for decades been at the core of the municipal strategy which focuses on energy efficiency, solar energy, wood, and biogas. In recognition for its achievements, Beckerich was the first municipality in Luxembourg to receive the European Energy Award Gold. The local authorities continue to be ambitious with the vision of Beckerich for 2030 being "Energy Autarky" (energy self-sufficiency). The municipality installed its first public solar panels to raise awareness of green technology among its citizens (consequently, there has been an increase of private solar panels installations), it is the first community solar panels in Luxembourg installed on the roof of the local warehouse. The municipality's vision relies on:

- A clear strategy based on objective facts and figures.
- A creative and well-worked-out communication and PR concept.
- A regular evaluation of the achieved progress.

- An active participation of all actors concerned.
- A continuous exchange of experience and good practice.
- National framework conditions supporting local actions.
- Identification with the developed vision.

Yet, some individual habits could still benefit from improvement. For example, only 0-2 people deliver wood to the wood-chipping facility, indicating a still low community participation in this initiative.

► District Heating Network

The district heating network in Beckerich, is an innovative example of sustainable energy management, aiming to reduce greenhouse gas emissions and promote the use of renewable energy within the community. Biomethanisation and wood chip heating plants are the two sustainable technologies used in the district heating network to provide renewable energy (Figure 3):

- Biomethanisation:
 - Commissioning: 2004
 - Electrical output: 800 kW / Thermal output: 850 kW
 - Biogas cooperative of 19 farmers
 - Total investment: 4'000'000 € (government subsidy: 47% and private investment: 2%)
 - Electricity production: 6'981 MWh/a
 - By-products: Heat (5'938 MWh/a) and fertiliser.
- Wood chip heating plant:

Built in 2008 and expanded in 2015 to meet the community's growing energy needs in the municipality. Unlike the biogas plant, the woodchip boiler produces only heat and no electricity.

- Thermal capacity: 2 X 2 MW
- Types of wood used in the heating plant:
 - o 308 ha of public forest + 405 ha of private forest
 - o Waste from the wood processing industry
 - o Landscaping.

The district heating network is made to residents, municipal buildings and companies and consists of 9 km of pipes (with a loss of - 1°C/km), as illustrated in the map in Figure 2. The heat network supplies 4 out of 8 villages with renewable heat. It is available to residents, municipal buildings, and businesses.

Number of connections to the heating network:

- Households: 233

- Companies: 7
- Public buildings: 22
- Total: 262

Total heat consumption in 2020 was 12,017 kWh, which is approximately equivalent to 120,170 litres of fuel.



Figure 3 – Different pictures of the Biomethanisation and the Wood chip heating plant of the district heating network.

The DHN is a crucial tool for Beckerich in reducing its environmental impact. As part of the Climate Pact, Beckerich has been awarded the highest certification, Category 4, largely due to this initiative.

2.2.1.2 Public space and urban accessibility

- Urban and landscape structure of Beckerich: Rural character and forests

Beckerich is distinctly characterized by its rural nature, especially in the southern part of the municipality, where extensive forests spread over sandstone soils. These forests, reaching altitudes of up to 400 meters, serve as valuable natural habitats and recreational areas for both locals and visitors. In contrast, the northern part of the commune is dominated by farmland, comprising meadows and fields, creating a varied and harmonious landscape that balances nature and human activity.

- Morphology and landscape integration

The urban structure of the municipality combines traditional and contemporary elements. The historic centres, particularly Oberpallen and Noerdange, retain the density typical of old villages, with local building materials. In contrast, other localities such as Elvange and Hovelange have developed along the main roads, forming linear built-up areas. The topography, characterised by rolling hills and river systems, has been well integrated into the urban development, providing an ideal natural environment for walks and outdoor activities.

- Public spaces and accessibility

Beckerich has functional public spaces adapted to a rural population. These include children's playgrounds in various localities, and a sports campus in Hovelange, with a multi-purpose hall and sports fields. However, there is still room for improvement in terms of accessibility. Most bus stops are adapted for people with reduced mobility, but they often lack practical information such as local maps or timetables. Better connections between public spaces and residential areas, including safe pedestrian and cycle routes, would improve their use by the whole population.

- Green infrastructure and ecological connectivity

Beckerich benefits from a rich network of green infrastructure, integrated into the municipal territory. Orchards, hedgerows and wetlands play a key role in preserving biodiversity and also provide recreational areas for local residents. Watercourses such as the Pall act as essential biological corridors, linking protected natural habitats.

The municipality focuses on ecological connectivity to facilitate species migration and maintain environmental balance. Restoration initiatives and the creation of buffer zones along natural areas are part of future plans to reinforce this green infrastructure.

► Mobility and sustainable development

Mobility in Beckerich is largely based on the use of cars, due to the remoteness of the localities and the absence of rail links. Regular bus services provide hourly connections to Luxembourg City and regional centres, but their use remains limited. Flexible services, such as local shuttles, are positive initiatives, but they do not cover all needs.

For cyclists, the commune offers several cycle paths, such as the national cycle path no. 12. However, on the main roads, the absence of cycle paths or lanes limits safety. The installation of charging stations for electric vehicles illustrates a commitment to more climate-friendly mobility, but further efforts are needed to develop sustainable transport planning.

► Urban and environmental challenges

Managing the balance between growth and preservation of rural character is one of the major challenges. In the past, urban sprawl led to excessive land consumption. Today, efforts are focused on densification and the use of vacant space.

Dependence on the car, particularly in small towns without local shops, remains a problem. In addition, many farm buildings are vacant or under-utilized, posing economic and structural challenges. The aim is to promote sustainable, resource-efficient development that meets the social and environmental needs of residents.

2.2.1.3 Infrastructures and services (ICT, public equipment, etc.)

The municipality is more and more becoming a dormitory town, a trend prevalent in many municipalities in Luxembourg. The community aspect is decreasing especially for young people, as it is not exactly clear where they meet in their free time, for instance. Some attempts have already been made through, Facebook and Instagram. A public library and football club are in discussion. Once the school building is liberated, a third place could potentially be imagined there, even for the neighbouring municipalities/ies¹.

► ICT infrastructure in the area

There is no public Wi-Fi network covering the commune, which is usual in such rural municipalities. However, Post has installed over 90% of its fibre optic network in the commune.

► Economic activities in the area

¹ Sources: websites of Beckerich.lu and service providers, Beckerich interviews by REGEN's team

In terms of economic activities, there are approximately 80 active businesses, including public companies, individual sole proprietors, consultants, and farms, with a notably high proportion working in the domains of energy efficiency, sustainability, and ecology.

► Social infrastructure and services

The social services available for the inhabitants of Beckerich are listed below:

- Social office of the canton of Redange
- Haus CaRe – a social real estate agency focused on providing affordable housing.
- Club senior – providing space and programming for seniors: social issues, sports and travel, diverse courses, cultural activities (concerts, theatre, etc.) and conferences.
- Home for the Elderly St. Francis
- Residential and care home « Beim Glodknapp » - for people with dementia
- Päiperléck S.à r.l. – private home and care services
- Pastoral services of the St Claire parish
- SICONA kids – Nature experience for children in primary schools. Inspired by the nature guides of SICONA, SICONA kids teaches children and young people in nature and provides them with videos, photos, and useful tips, with a new programme every week [seems to be a regional or even a national programme, to be confirmed if specific to Beckerich]
- Action Locale pour Jeunes – The Local Youth Antennas (ALJ) are part of the National Youth Service (SNJ) and have the mission of supporting young people in their transitions to working life.

The public social infrastructure available for the inhabitants of Beckerich is listed below:

- Beckerich multi-sport hall
- Redange swimming pool

2.2.2 Socio-economic characterization

2.2.2.1 Residents' socio-economic profile

- Demographic composition & evolution (paying special attention to gender, origin, and age groups)

Population:

Table 3 – Population

8 Villages	Residents
Beckerich	862
Elvange	125
Hovelange	397
Huttange	28
Noerdange	621
Levelange	108
Schweich	291
Oberpallen	434
Total:	2.865

As at 17.09.2024, Beckerich had a population of 2,865 of 52 different nationalities.

Demographic trends:

Demographic trends are provided in Table 4

Table 4 – Demographic trends

Year	Residents
1910	1.908
1922	1.856
1930	1.803
1960	1.638
1970	1.570
1981	1.492
1990	1.618
2000	2.001
2010	2.284

Year	Residents
2020	2.708

Inhabitants:

Table 5 – Population by gender

Inhabitants			TOTAL
Age group	female	male	
00-05	78	74	
05-10	78	83	
10-15	75	77	
15-20	72	97	
20-25	96	96	
25-30	90	102	
30-35	110	118	
35-40	102	112	
40-45	92	89	
45-50	90	98	
50-55	94	99	
55-60	107	105	
60-65	116	117	
65-70	74	68	
70-75	49	42	
75-80	43	35	
80-85	21	28	
85-90	16	7	
90-95	8	4	
95+	1	2	
Total	1412	1453	2865
Seniors	212	186	398
			13.9%

► Economic information related to unemployment.

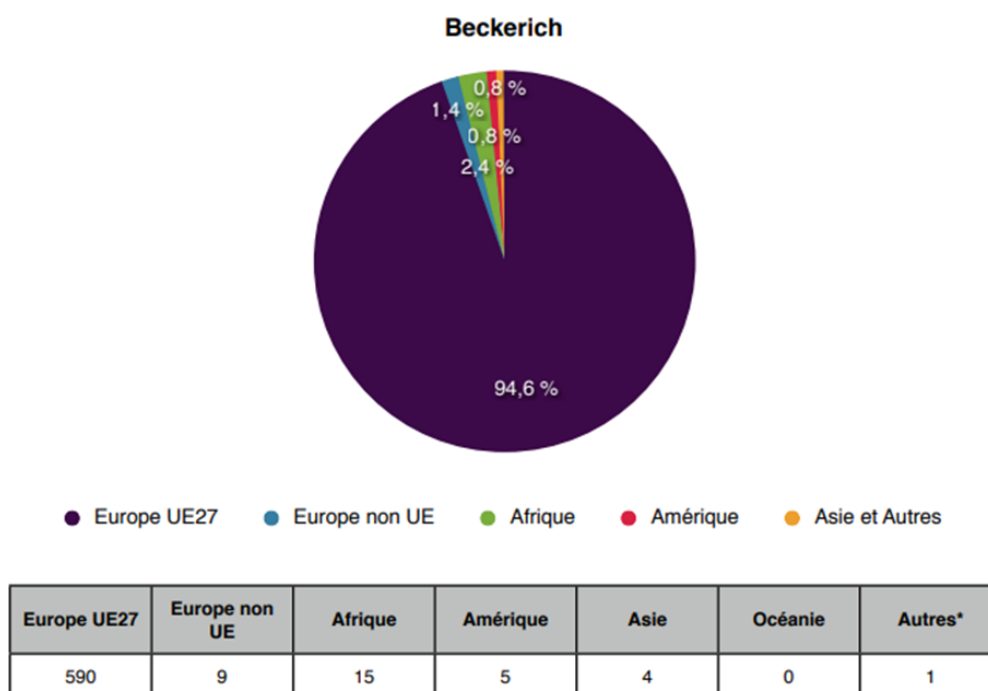
Table 6 – Unemployment rate in Beckerich (source STATEC)

Variable	Population ayant un emploi au total	dont: Salariés	dont: Non-Salariés	Chômeurs	Population active	Taux de chômage (en %)
Spécification						
• • Feulen *	1 100	1 030	70	46	1 146	4,01
• • Mertzig *	1 070	1 010	60	43	1 113	3,86
• • Reisdorf *	630	590	40	58	688	8,43
• • Schieren *	1 030	970	60	37	1 067	3,47
• • Vallée de l'Ernz *	1 330	1 190	140	51	1 381	3,69
• Canton Redange *	9 430	8 490	940	434	9 864	4,40
• • Beckerich *	1 230	1 120	110	58	1 288	4,50
• • Eil *	800	710	90	25	825	3,03
• • Groussbus-Wal *	1 040	940	100	45	1 085	4,15
• • Préizerdaul *	810	740	70	32	842	3,80
• • Rambrouch *	2 130	1 890	240	129	2 259	5,71
• • Redange-sur-Attert *	1 360	1 210	150	49	1 409	3,48
• • Saeul *	460	400	60	20	480	4,17
• • Useldange *	940	860	80	42	982	4,28
• • Vichten *	660	620	40	34	694	4,90
• Canton Vianden *	2 460	2 260	200	129	2 589	4,98
• • Putscheid *	520	470	50	16	536	2,99
• • Tandel *	1 030	940	90	36	1 066	3,38
• • Vianden *	910	850	60	77	987	7,80

Table 7 – Average salary in Beckerich (source STATEC)

Salaires mensuels par commune						
Commune: Beckerich						
Fréquence: Annuelle						
Période: 2023						
Indicateur						
Moyenne		5 919,43994140625				
P10		1 871,90002441406				
Médiane		4 629,3603515625				
P90		10 242,9599609375				
P90/P10		5,47195911407471				
P50/P10		2,47308087348938				
P90/P50		2,21260809898377				
© Conditions d'utilisation			Salaires mensuels par commune			

Table 8 – Foreign population by geographic origin (percentage and number)



In the Grand Duchy, as in the municipality of Beckerich, foreigners who are nationals of an EU member state²⁷ are in the majority. In the Grand Duchy, they number 191,685 (86.9%). In the commune of Beckerich this percentage rises to 94.6% (590 people).

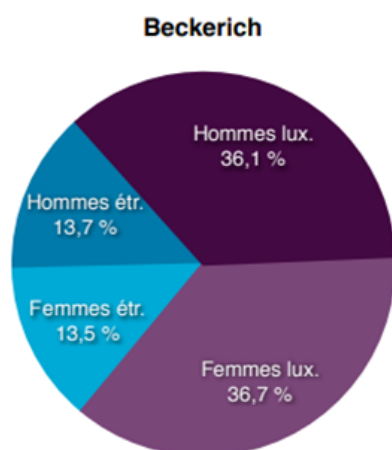


Figure 4 – Population by gender and origin.

In 2011, there were 257,386 women (50.2%) in the Grand Duchy, 108,706 of whom were of foreign nationality and 254,967 men (49.8%) including 111,816 non-Luxembourgers.

In the commune of Beckerich, women represent 50.2% of the population (841 Luxembourg women and 310 foreigners) and men 49.8%, i.e. 828 Luxembourgers and 314 foreigners.

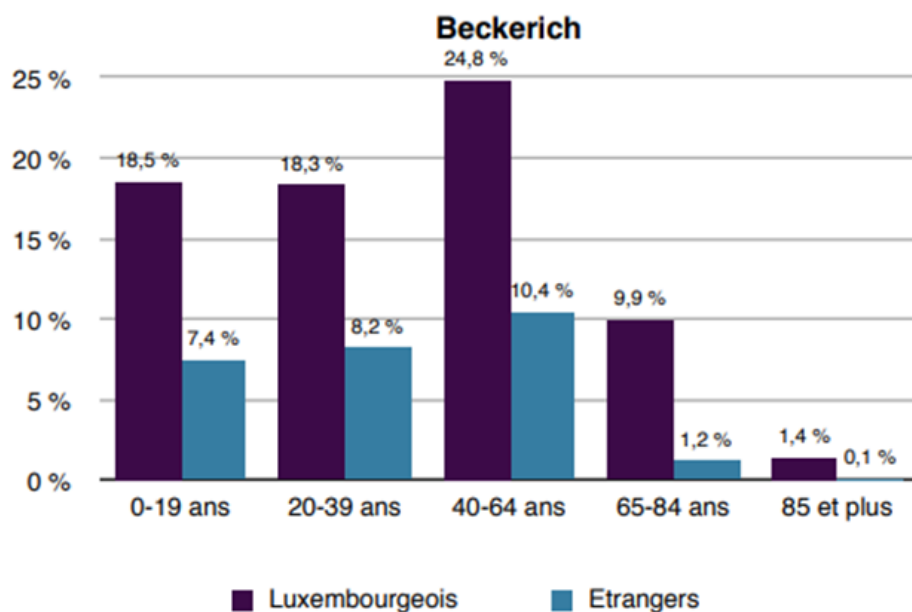


Figure 5 –Population by age and nationality (percentage).

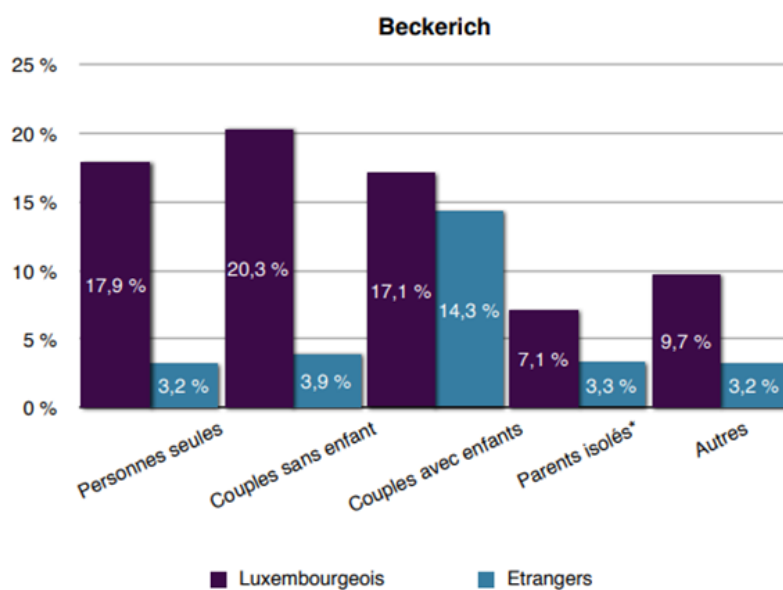


Figure 6 – Household type by nationality.

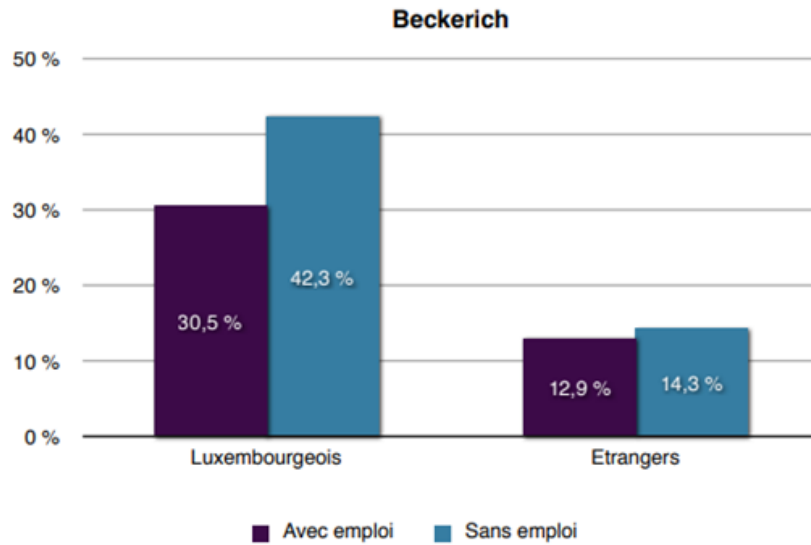


Figure 7 – Population employed and unemployed.

The unemployed population includes the unemployed people working in their own household, pupils and students, pensioners and an “Other” group, students, pensioners and an “Other” group. Included under “Other” are “owner/annuitant”, people who ‘are not working but who have not given any further indication’, the “no indication” as well as ‘other situations’.

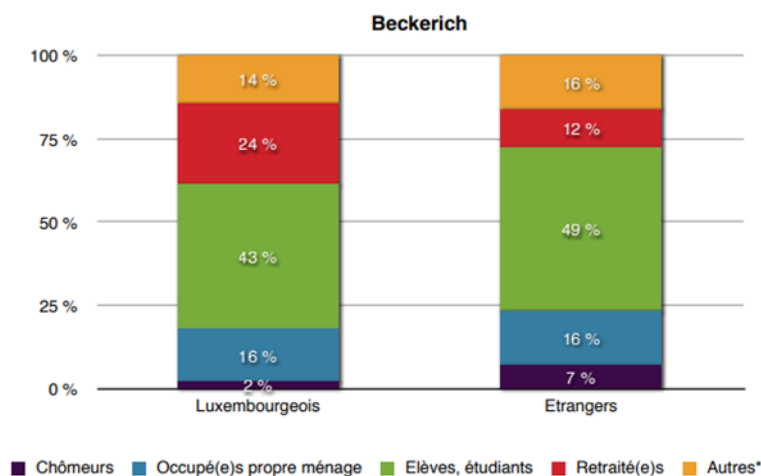


Figure 8 – Unemployed population. * The “Other” category includes “owners/pensioners”, “no indication under 15”, “other situations”, people “not working but no other indication” and “no indication”.

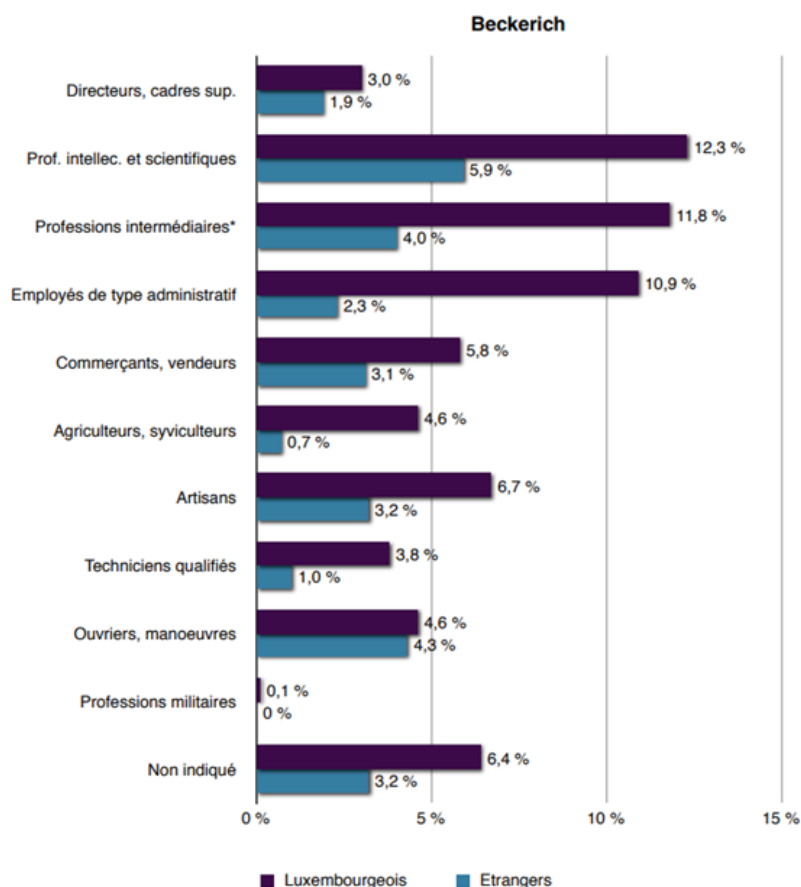


Figure 9 – Population by nationality and socio-economic status. * Intermediate professions : education, human health and social work. Sources : CEFIS / Ministère de la Famille, de l'Intégration et à la Grande Région / STATEC

2.2.2.2 Citizen and stakeholders' engagement

Beckerich has historically been one of the national leaders in terms of citizen participation. The noteworthy sustainability successes of the municipality have always been underpinned by strong citizen support and engagement.

Citizen participation, initially a strong point in Beckerich, has been somewhat declining in recent years. Attracting citizens to participate in the traditionally successful consultative commissions has recently been challenging.

Associations: The Municipality of Beckerich counts approximately 20 registered local associations with very diverse missions, ranging from culture (described in the following section) to sustainability. They are listed and briefly described below.

In line with its rich history of ecological transition and citizen participation, Beckerich is a host of sustainability- and citizen-centred initiatives²:

- De Kär Asbl (Beki) – sustainable finance association – The Beki is based on the pillars of solidarity, innovation, and autonomy. Through the Beki, the regional currency of the canton of Redange, the De Kär association is committed to the sustainable development of the canton and its municipalities. The Beki is a creative and innovative alternative to the predominant economic system. The De Kär association is an open platform that allows every citizen, association, municipality or entrepreneur to participate in the realization of this new form of economy, which is at the service of the citizens of the region. This new model lives and grows through cooperation, mutual respect and the good faith of its actors. Beki is an innovative instrument that promotes solidarity between the actors who use it and thus strengthens the autonomy of the region – sustainability, finance.
- D'Millen asbl – see the culture section further below.

Humanitarian relief and healthcare-related organisations:

- Aide Philippines Asbl – humanitarian aid for the Philippines
- Les enfants du Monde A.s.b.l – humanitarian aid non-profit focused on orphans and other vulnerable children, located in Schweich.

Organisations devoted to specific target audiences on a national level:

- Autisme Luxembourg Asbl – association working in the field of autism, especially focused on education.
- AMIPERAS – the association representing the interests of seniors in various aspects.
- AFEDI (Association Francophone Européenne des Diagnostics, Interventions et Résultats Infirmiers) – a Luxembourg division of AFEDI.com, European Francophone Association of Nursing Diagnostics, Interventions and Results International Association.

Local community and hobby associations:

- Elterenvereenegung – parent association
- Fräizaitclub – free time association, located in Oberpallen.
- LGS Mahatma Gandhi Beckerich – Lëtzebuerger Guiden a Scouten Mahatma Gandhi Beckerich – a local guides and scouts association.
- Nerdener Duerffrënn a.s.b.l – Näerdenvillage friends association.
- Oldtimerfrënn Biekerech asbl – old-timers' friends' association.

² Source: Beckerich.lu municipality website.

Local trade union representations:

- LCGB Beckerich – Schweecherdaul – a local section of the Luxembourg Confederation of Christian Trade Unions (LCGB).
- OGBL – a local section of the Independent Luxembourg Trade Union Confederation, also OGBL or OGB-L, is a Luxembourg general union.

Consultative (advisory) commissions in the municipality: Municipal consultative commissions play an important role in involving citizens as much as possible in the political life of the municipality. Municipal commissions are responsible for making recommendations to municipal authorities and taking a position on issues falling within their respective areas of competence. The establishment of certain commissions is mandatory by law or regulation, which also determines their composition. Other commissions are optional and are established by the municipal council's decision. The principle of their existence results from municipal law.

In the context of REGEN, the most relevant commissions to be considered are (2023-2029):

A) Statutory or regulatory advisory commissions

1. School board

At the communal level, the partnership between school authorities, school staff and parents is exercised through the communal school commission, which is an advisory body to the communal council.

The communal school commission is set up by the commune or the syndicate of communes.

Without prejudice to the powers set out in other articles, the school commission is responsible for:

- monitor the implementation of school organization and school success plans.
- promote extra-curricular activities by fostering information, exchange and consultation between parents, school staff and services and organizations providing care for pupils outside normal school hours.
- to issue an opinion on reports drawn up by the Agency for the Development of the Quality of Teaching in Schools, and to bring to the attention of the College of Burgomasters and Aldermen anything it deems to be detrimental to the interests of basic education.
- issue an opinion on proposals concerning the school budget.
- participate in the design, construction, or conversion of school buildings. (Law of February 6, 2009, on the organization of basic education, art. 50)

B) Advisory commissions set up by the local council

1. Communal Commission for Intercultural Living Together

The communal advisory commission on integration, hereinafter referred to as “the commission”, advises and, where necessary, assists the communal authorities in particular to:

- identify priorities and any obstacles encountered in the field of intercultural living together at the municipal level.
- assist the commune in developing and implementing measures and activities to promote intercultural coexistence within the commune.
- promote access to information, civic participation, and community life.
- encourage dialogue, intercultural exchange, and mutual understanding between all residents of the commune.
- to ensure respect for the values of intercultural coexistence, and to raise awareness and implement measures to combat racism and all forms of discrimination in the commune.

2. Culture Commission

The Communal Advisory Commission on the Environment and Mobility advises and, where necessary, assists the communal authorities, in:

Environmental issues:

- advice and proposals on environmental issues and nature protection.
- promoting respect for nature.
- promoting environmental protection and sustainable management of natural resources.
- raising awareness and educating residents about environmental and climate issues (biodiversity, climate change, renewable energies, sustainable practices, use of natural resources, etc.).
- organization of initiatives and awareness campaigns, educational workshops, and events to promote collective awareness.

Mobility:

- support the implementation of the soft mobility network.
- analyse traffic-related issues within the municipality.
- organize public awareness campaigns, in close collaboration with municipal departments.
- identify and analyse public transport problems and propose improvements and solutions.
- propose improvements to public infrastructure accessibility for people with reduced mobility.
- advise on proposed changes to general traffic regulations.

3. Environment and Mobility Commission

Missions:

Environment

- opinions and proposals on environmental issues and nature protection.
- promotion of respect for nature.
- promotion of environmental protection and sustainable management of natural resources.
- raising awareness and educating local residents about environmental and climate issues (biodiversity, climate change, renewable energies, sustainable practices, use of natural resources, etc.).
- organization of awareness-raising initiatives and campaigns, educational workshops, and events to promote collective awareness.

Mobility

- support the implementation of the soft mobility network.
- analyse traffic-related issues within the municipality.
- organize public awareness campaigns in close collaboration with local departments.
- identify and analyse public transport problems and propose improvements and solutions.
- propose improvements to public infrastructure accessibility for people with reduced mobility.
- advise on proposed changes to general traffic regulations.

4. Youth and Sports Commission

The municipal advisory commission for youth and sport advises and, where necessary, assists municipal authorities, with:

- opinions and proposals on initiatives and programs to be set up in the fields of youth, sport, and health.
- encouraging the practice of sport within the municipality and promoting an active, healthy lifestyle
- raise health awareness.
- contributing to the well-being and development of citizens, particularly young people, while respecting their physical and mental health
- promote interaction between local players active in the fields of youth, sport, and health.

2.2.2.3 Cultural and creative initiatives

Besides the Cultural Consultative Commission mentioned above that advises on cultural policy in the municipality, **Kultur Millen** (D'Millen asbl) is the main cultural actor of Beckerich:

- [D'Millen asbl](#) – Based on the vision of the former mayor of Beckerich, Camille Gira, the non-profit Kulturmillen, located in the renovated former mill of Beckerich, has a dual mission: to develop the cultural and tourist potential through various activities (conferences, exhibitions, workshops, concerts, etc.) and to raise awareness among the local, regional and external population about sustainable development and the preservation of heritage, in particular by guided tours.
 - Cultural guided tours organised by D'Millen asbl: Several tours and guided tours focused on different social groups and interests.
 - Energiemusée – This aims to reflect the history of energy in the municipality of Beckerich. Modern and interactive, the Energiemusée can be visited in groups or individually.
 - Millegalerie – A gallery accessible to all, offering a new unique experience with each visit. Space designed to present the colours of the present through contemporary works
 - Cultural events – Kulturmillen runs regular cultural activities, example agenda below:



Figure 10 – Example of agenda Kulturmillen

- Workshops and courses – Kulturmillen has a rich programme of workshops and courses, example agenda below:

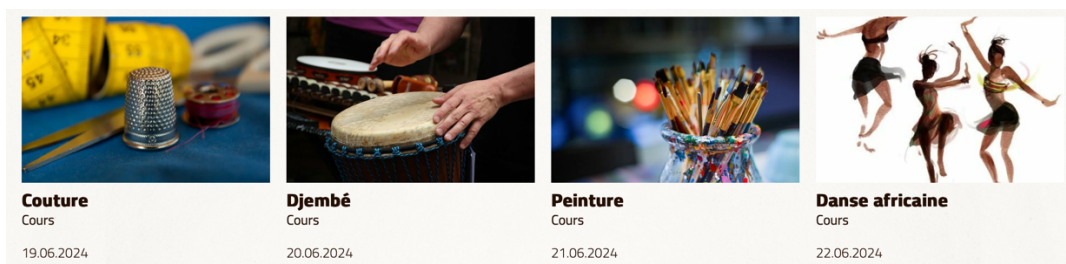


Figure 11 – Example of a programme of workshops at Kulturmillen

- Närdener Gare – Old Railway Station Museum – the first of its kind in the Grand Duchy of Luxembourg, it is a museum dedicated to the regional railways that enabled economic development in the regions surrounding the city of Luxembourg and the mining centers of the time at the end of the 19th century.
- Visit Wëlle Westen guided tours – a range of tours in or including Beckerich.

There are also as many as five choral associations which are numerous for a small municipality such as Beckerich (*Commune Beckerich*, n.d.).

3 Laredo demo site

Laredo town, in Spain, is structured into three very different zones: (i) the historic town neighbourhood called La Puebla Vieja, (ii) the area of the newer suburbs or “Ensanche” and (iii) the extension of the suburbs towards El Puntal. It is in the first of these areas, La Puebla Vieja, where the REGEN demo is implemented.

La Puebla Vieja, the historic town centre of Laredo, spanning 0.076 square kilometres, is a valuable cultural heritage site. However, it faces significant threats due to the growing neglect of its architectural heritage and a declining, ageing population.

3.1 Territorial characterization

3.1.1 Physical characterization

► Natural & geographical characteristics

Laredo is a coastal city located in the autonomous community of Cantabria, Spain, in its Eastern Coast region. It has historically been the county-seat town.

It is situated on the Asón River estuary, near the Santoña, Victoria, and Joyel Marshes Natural Park. The town’s most notable natural feature is a four-kilometre sandy stretch: La Salve Beach an immense stretch of sand beach. This led to enormous urban growth along the coastline (far from the historic town) during several decades of the last century.

► Infrastructures and services (ICT, public equipment, etc.)

The town’s economy is influenced by seasonal activity; in any case, it offers a variety of services for its citizens, including healthcare facilities, educational institutions, and public transportation. Regarding its main economic sector (tourism), it is well-equipped for the beach and tourism services, as well as facilities for water sports activities, making it a popular destination for visitors.

Laredo has fibre optic connectivity deployed in the municipality through different private operators. As a place of tourist activity, the facilities aimed at this sector offer a high level of connectivity to visitors.

On the other hand, Laredo Town Council has three TeleCentres (Advanced Communications Centres) located in the town centre. This service is carried out in collaboration with the Ministry of Industry and Technological Development of the Government of Cantabria.

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The TeleCentres offer a service aimed at the general public. They are open and free of charge and are equipped with the necessary software and hardware for optimum operation.

Other facilities, such as the Laredo Hospital, have a Wi-Fi network system that can be used free of charge by patients and their companions during their stay in the hospital.

► Building stock and retrofitting needs

The building stock in Laredo is quite diverse. The historic fisherman's town features narrow streets and buildings from the 16th and 18th centuries, characterized by wooden structures and stone walls. In contrast, the newer suburbs outside the historic neighbourhood and along La Salve Beach were mainly developed in the 20th century, consisting mostly of apartment complexes and residential blocks with reinforced concrete structures and brick or concrete block infill. I. Both types of buildings require retrofitting to enhance energy efficiency and habitability. Additionally, the old town buildings need improved accessibility. However, the town's touristic nature poses a challenge for retrofitting seaside buildings, as many flats are second homes used only in summer, with owners reluctant to invest beyond the minimum.

► Energy supply and consumption patterns

These older structures in the historic town need retrofitting as they often lack insulation and energy-efficient systems. The residential buildings of the rest of the town typically have better initial energy performance but considering that around 70 % of them were built before 1980, when the regulation for thermal insulation became compulsory, they can still benefit from retrofitting.

In Laredo, the energy supply primarily consists of electricity and natural gas, like many other regions in the country. It has a total number of 1245 buildings, 18890 dwellings and only 3091 energy certificates with the following percentages of performance certificates of global emissions and energy consumption:

Table 9 – Laredo Energy certificates. Source: Gobierno de Cantabria.

LAREDO ENERGY CERTIFICATES				
Number certificates	Global emissions	%	EPNR consumption	%
	A	0,1%	A	0,1%
	B	0,2%	B	0,1%
	C	0,8%	C	0,5%
	D	4,1%	D	3,1%

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LAREDO ENERGY CERTIFICATES				
Number certificates	Global emissions	%	EPNR consumption	%
	E	61,4%	E	49,0%
	F	16,4%	F	12,0%
	G	17,0%	G	35,3%
3091				

► Mobility & accessibility

Laredo is midway between Bilbao and Santander, about 50 km from both via the A-8 highway. The highway passes nearby, overshadowing the old N-629 route that goes through Laredo. Public buses offer frequent services to both capitals, taking around 40-50 minutes. The nearby Treto railway station also provides connections, though the service has declined in competitiveness.

At town level connectivity should be strengthened by promoting multimodal transportation options such as buses, and more bike lanes, enabling a gradual shift away from the motorized mobility model. The neighbourhood along the beach is largely accessible to all, and recent urban development increasingly favours active mobility, including cycling and walking. The old town, characterized by steep streets and numerous stairs, is undergoing accessibility improvements. Several projects and initiatives are focused on constructing mechanical ramps and lifts to enhance accessibility.

3.1.2 Socio-economic characterization

Laredo is one of the main tourist destinations on the Cantabrian coast; it attracts a huge number of seasonal tourists to the newer side of the town, while the historic part receives very little economic activity, and it has been hidden during the last few decades.

► Socio-economic profile

Tourism and the population with second homes are key factors in understanding socioeconomic activity. The municipality is addressing this issue and exploring sustainable ways of visiting and coexisting with the local community.

The unemployment rate reflects the high seasonality driven by the tourism sector, as shown in the following figure, which illustrates the increasing trend from July to January.

D3.1 - Diagnosis and Baseline for all the demo sites

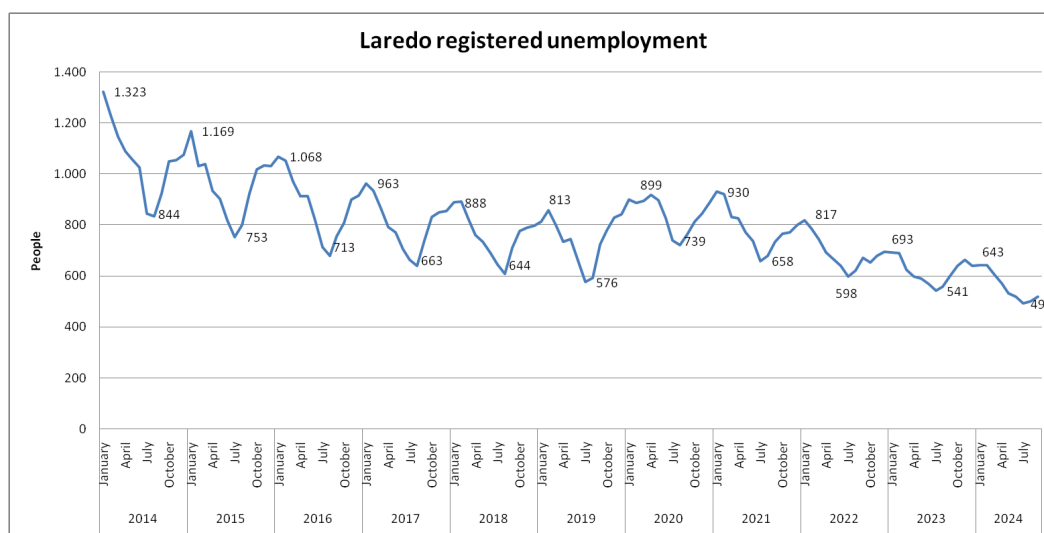


Figure 12 – Source: ICANE based on microdata mining of Jobseekers, Registered Unemployment and Contracts. Registered Labour Movement. State Public Employment Service (SEPE), www.ican.es

► Regional stakeholders

The main actors at the administrative and political level in the territory are the Municipality of Laredo and the Government of Cantabria. Both working together, from an institutional and technical point of view, in the development of projects that may exceed the economic capacity and competencies of the municipality. An example of this collaboration is the construction of affordable rental housing in the Puebla Vieja, or other types of accessibility projects such as the installation of mechanical ramps, a lift and a footbridge to optimise the entrance to the historic centre of Laredo.

► Citizen and stakeholders' engagement

In a first analysis of the project's key actors, the following groups have been identified:

- Cultural associations : Asociación de Amigos del Patrimonio de Laredo, Agrupación Los Pejinos, Asociación Cultural “Las Panchoneras”, Asociación Cultural El Palenque.
- Educational resources: schools and parents' associations of the schools.
- Key persons: municipal architect, head of the municipal archive, Celdrán grocery shop, Santa María church guide, neighbours of La Puebla.
- Media: Radio Laredo, local radio station, and De Laredu Lin TV, local TV.
- Social organization's: AMPROS
- Municipal resources: social services, town planning and environmental services, municipal police, Dr. Velasco cultural

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centre, Antiguo Ayuntamiento exhibition hall, local development agency.

This is an open list that will be expanded throughout the project.

The Laredo Town Council has a structured framework for citizen participation, as outlined in its Citizen Participation Ordinance. This ordinance defines citizens' rights and responsibilities regarding municipal management, promoting transparency and active community involvement in local affairs.

The Department of Youth, Transparency, Citizen Participation, and Equality oversees citizen participation. This department is tasked with designing and implementing strategies to encourage citizens' and stakeholders' engagement in municipal decision-making processes.

One of the key initiatives within this framework is the Participatory Budgeting process. This initiative allows citizens to propose and vote on projects they deem beneficial for the community. For instance, in 2021, the Town Council allocated €100,000 to fund the most popular projects, including the enhancement of children's play areas in schools and the creation of a skate park.

Additionally, the Town Council maintains a dedicated section for participatory processes on its transparency portal. This platform provides updates on ongoing initiatives and facilitates citizen involvement.

This comprehensive approach underscores the Town Council's commitment to fostering the active participation of citizens and stakeholders in municipal governance and ensuring that decisions align with the community's needs and aspirations.

► Cultural and creative ecosystem (stakeholders, activities...)

The Camino de Santiago passes through the municipality, serving as a major attraction that not only draws tourists but also supports local artisans and the creative economy. Additionally, the municipality has a rich cultural activity rooted in its cultural heritage, such as the "Recreation of the Last Landing of Charles V". These two historical routes will soon be joined by the Hansa Route, from the Baltic countries, placing Laredo in a privileged place within the European cultural itineraries.

The town has hosted the summer courses of the University of Cantabria since 1984, promoting academic activity in different fields which is complemented by a parallel cultural programme of conferences and meetings. Laredo forms part of the regional cultural circuits 'Escena Cantabria', 'Culture and Territory' and the Regional Film Library, offering a

D3.1 - Diagnosis and Baseline for all the demo sites

stable cultural programme throughout the year, in addition to the towns' programme that includes, cinema, art exhibitions and conferences.

Culture and tourist attractions combine in some famous festivals of which the Battle of Flowers emerges as the most renowned and vibrant. The festival of San Roque is also a well-known cultural activity.

On the other hand, the Dr. Velasco House of Culture is a municipal facility, a benchmark for cultural activity in the town with an extensive programme that includes cinema, theater, book presentations and more.

► Economic ecosystem

Laredo has historically relied on fishing and canning activity. It has currently a high dependency on tourism, particularly seasonal tourism, which leads to a local economy primarily based on the service sector. The shift towards service-oriented activities in Laredo is mainly due to the significant tourism activity in the municipality. Within the service sector, hospitality, which employs a large portion of the active population, is particularly notable during the summer. Analysing the activity distribution in 2023, the service sector still plays a major role in the local economy (80% when combining commerce, hospitality, and other services).

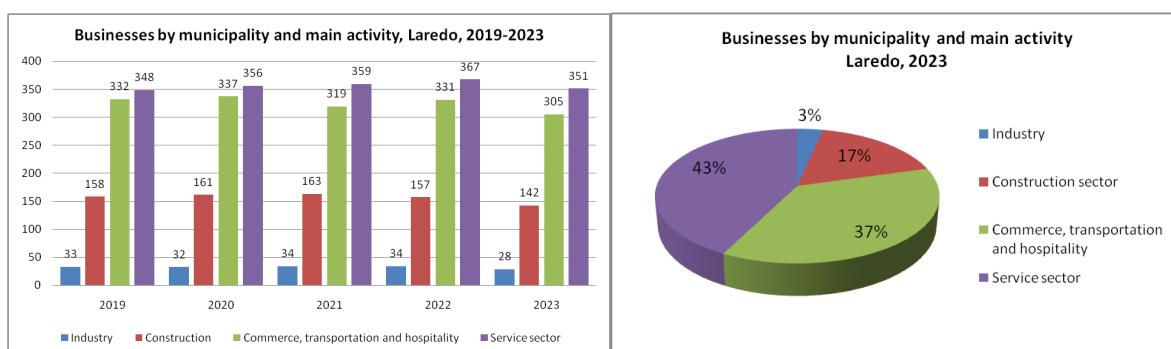


Figure 13 – Distribution of companies by sectors (INE) / Evolution of the number of companies in the analysed sectors during 2019-2023.

3.2 Intervention area

3.2.1 Physical characterization

La Puebla Vieja is the original population centre, dating back to the Middle Age, and it still preserves the remains of its old walls. It consists of a network of small streets, on which large stately houses from the 16th to the 18th centuries stand. It was declared a Historic Artistic Site in 1971 for its “historical preponderance” combining mansions, palace towers, churches, and monasteries.

The settlement responds to a fishing village, strategically located on a hillside: at the foot the fishermen's port, protected from the north-east

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winds, and at its summit, on a slope of more than 300 metres, a defensive vision. This original slope conditions the current accessibility of La Puebla.

3.2.1.1 Building stock

Being a historical site, Laredo has a protection regulation that can sometimes limit the scale of interventions at neighbourhood and building levels. It has also established a limitation on the uses that can be implemented inside the boundaries of the Historic-Artistic Site.

Most buildings date back some centuries and there are several listed buildings dating back to the 16th and 18th centuries. Wooden structures and stone walls are mostly present.

► Building stock characteristics

The urban structure of the old town of Laredo follows a medieval urban layout with six octagonal streets. The area is known for its diverse building stock, which includes several Gothic and Renaissance buildings, and several towers and convents (detailed in the following section). Apart from those there are several traditional houses with simple wooden structures. The houses are detached with different floor numbers, with a maximum of five floors. It has 699 dwellings (from the Integral Rehabilitation Area (ARI) of La Puebla Vieja in Laredo declared on December 9, 2010).



Figure 14 - Map of “La Puebla Vieja” of Laredo with the identification of the construction year of the buildings.

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La Puebla Viejas's 91% buildings were built before 1980, which is significant since in Spain the Thermal isolation regulations were entered in 1980.

► Heritage protection

The Law 16/1985, of June 25, on Spanish Historical Heritage declares historical ensembles as "the grouping of immovable property that forms a settlement unit, continuous or dispersed, conditioned by a physical structure representative of the evolution of a human community, as a testimony of its culture or constituting a value for use and enjoyment by the community." The Puebla Vieja of Laredo was declared as such on January 2, 1971, for its "historical preponderance," which includes a collection of manor houses and tower palaces, churches, and monasteries. This declaration also includes the area of the Hermitage of San Martín and Santa Catalina.

In Cantabria, the Law 11/1998, of October 13, on Cultural Heritage of Cantabria regulates the protection and conservation of heritage through, among other aspects, the division of cultural assets into three categories: Asset of Cultural Interest (BIC), Asset of Local Interest or Cataloged (BIL), and Inventoried Asset (BI). The triple objective is to: define more precisely the interest of all components of the heritage, facilitate the work of its managers, and finally, deepen the conservation and rehabilitation of the so-called "minor heritage." The Asset of Cultural Interest is defined by Law 11/1998 as "an asset that, due to its specific qualities, defines by itself a prominent aspect of the culture of Cantabria." The Puebla Vieja of Laredo as a whole is among the cultural assets under the category of historical asset since 1971 and has therefore enjoyed special protection for decades. Within it are other BICs listed below:

- Church of Santa María de la Asunción. Declared on June 4, 1931, in the Gazette under the category of monument.
- Various musical organs located in several religious buildings. The organ of the Church of Santa María de la Asunción was declared on March 13, 2012, under the Heritage Law in the category of immovable property.
- Fort El Rastrillar. Declared on November 14, 2011, under the Heritage Law as a monument.

At the municipal scale, some buildings are classified according to the degree of protection they require and their value. As stated in the Special Plan of Puebla Vieja of 1999, the definition of levels for each building corresponds to the architectural quality of the building in question, associated with the quality of the space in which it is located. For this purpose, the building file and catalogue establish the architectural quality of each building in the classifications of monumental, notable or singular, environmental, and buildings of neutral and harmful character. These latter classifications are

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understood in terms of their environmental significance and are considered about the quality of the space in which they are located to determine their level of protection.

Additionally, there are other properties of high heritage value, such as the wall that surrounded Puebla Vieja and its (now non-existent) walkway, an element of interest that has been successfully recovered in many historic centers. All interventions located around the wall must consider the impact and adhere to its conservation to avoid jeopardizing future actions aimed at its recovery, enhancement, and dissemination.

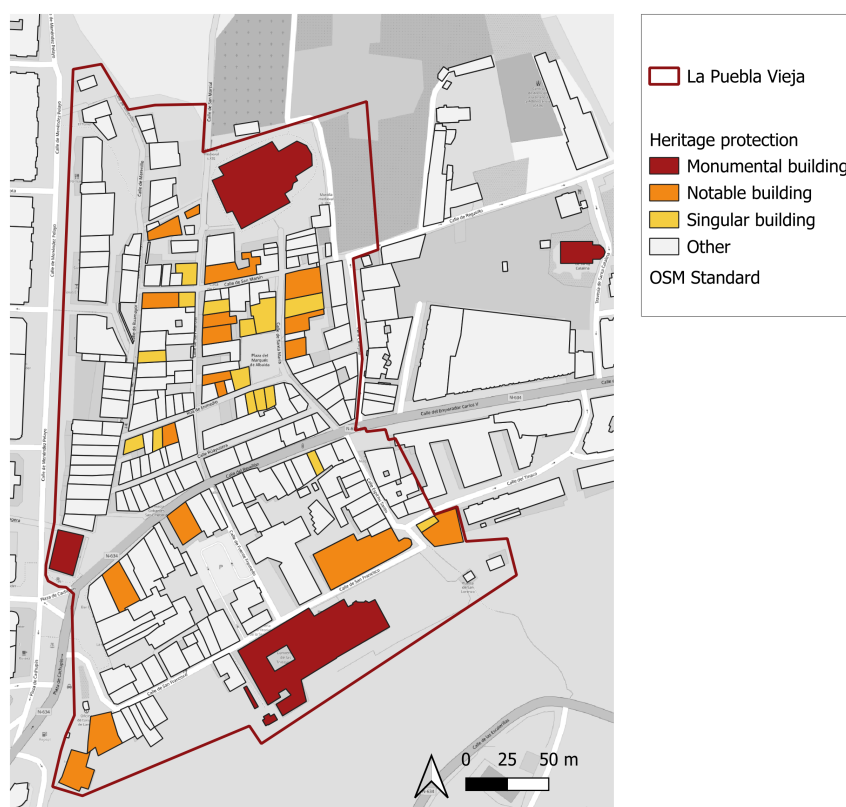


Figure 15 - Map of “La Puebla Vieja” of Laredo reflecting the heritage protection levels of the different buildings.

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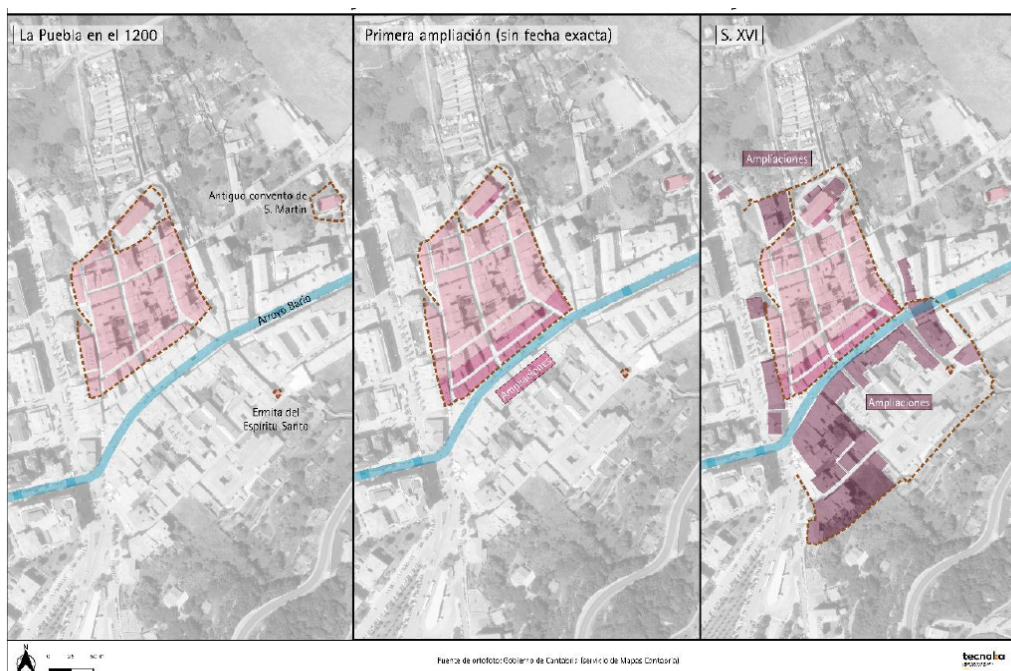


Figure 16 – Maps showing the growth of the old town between XIII and XVI centuries.

► Energy and retrofitting characterization.

The overall performance of the residential buildings of the intervention area

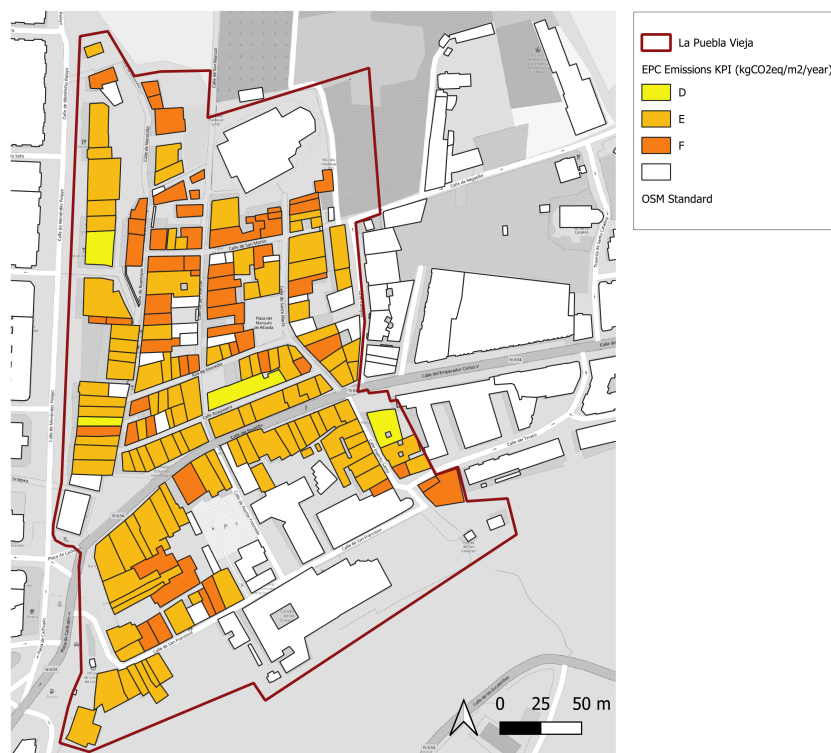


Figure 17 - Map of “La Puebla Vieja” of Laredo reflecting the EPC emissions KPI of the different residential buildings.

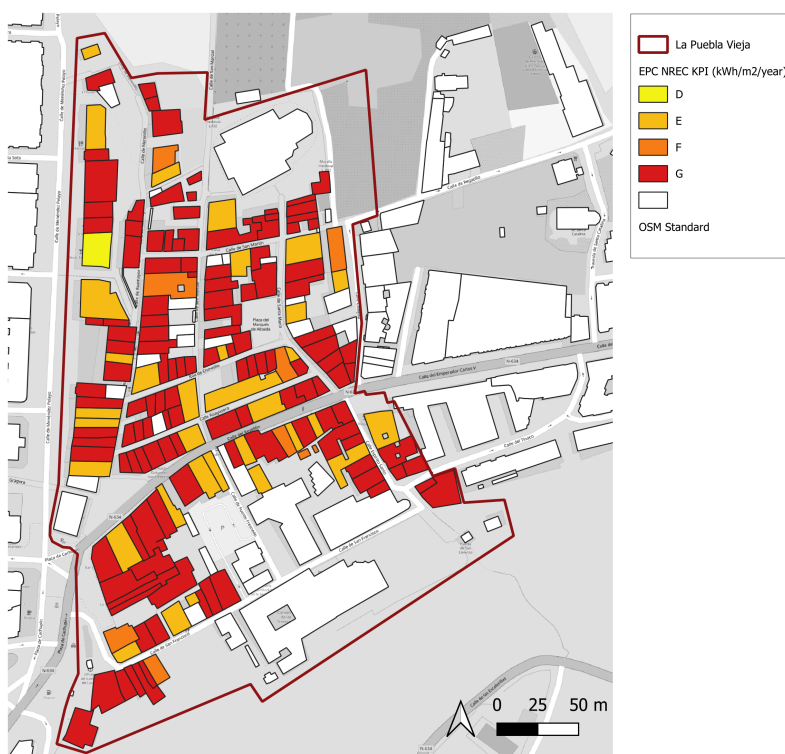


Figure 18 - Map of "La Puebla Vieja" of Laredo reflecting the EPC NREC KPI of the different residential buildings.

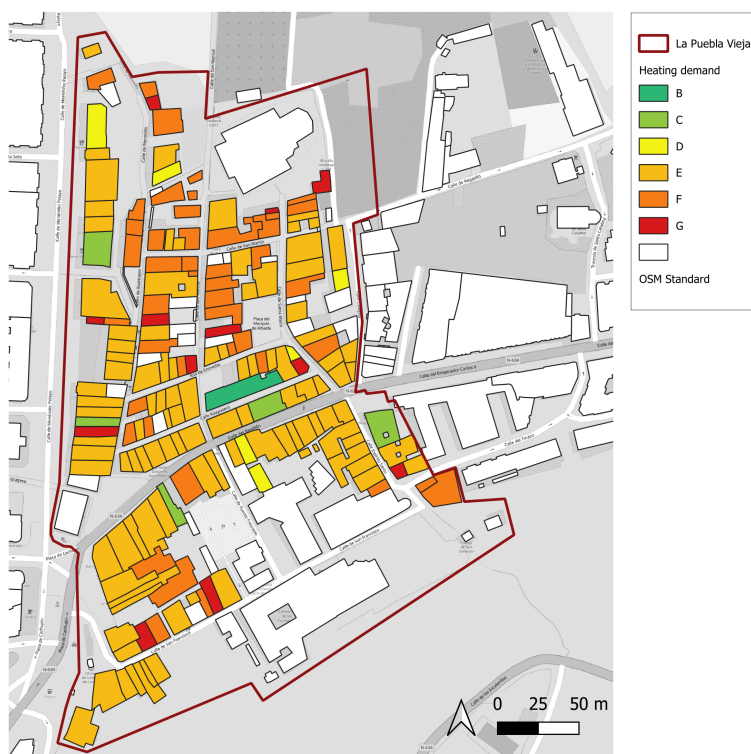


Figure 19 - Map of "La Puebla Vieja" of Laredo reflecting the heating demand of the different residential buildings.

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3.2.1.2 Public space and urban accessibility

The Special Plan “La Puebla Vieja,” drafted in 1999 and currently under review, aims to prevent the area’s abandonment and unplanned actions, focusing on preserving heritage, addressing socioeconomic issues, and improving services. Despite its potential, public spaces remain underutilized and lack essential urban furniture, impacting habitability and walkability. A 2010 study showed that 37% of residents perceived common areas as deficient, a perception likely worsened without major interventions.

In Laredo, evening and nighttime activities in bars and restaurants have increased over the past two decades, boosting economic activity but causing residents to move to quieter areas. Service sector contracts rose from 3,932 in 2015 to 5,836 in 2019, though 1,856 jobs were lost during the pandemic. La Puebla Vieja has seen an increase in abandoned businesses and vacant properties, contrasting with the stable hospitality sector in the rest of Laredo. Despite maintenance efforts, the urban landscape remains neglected, with many degraded and unsanitary areas.

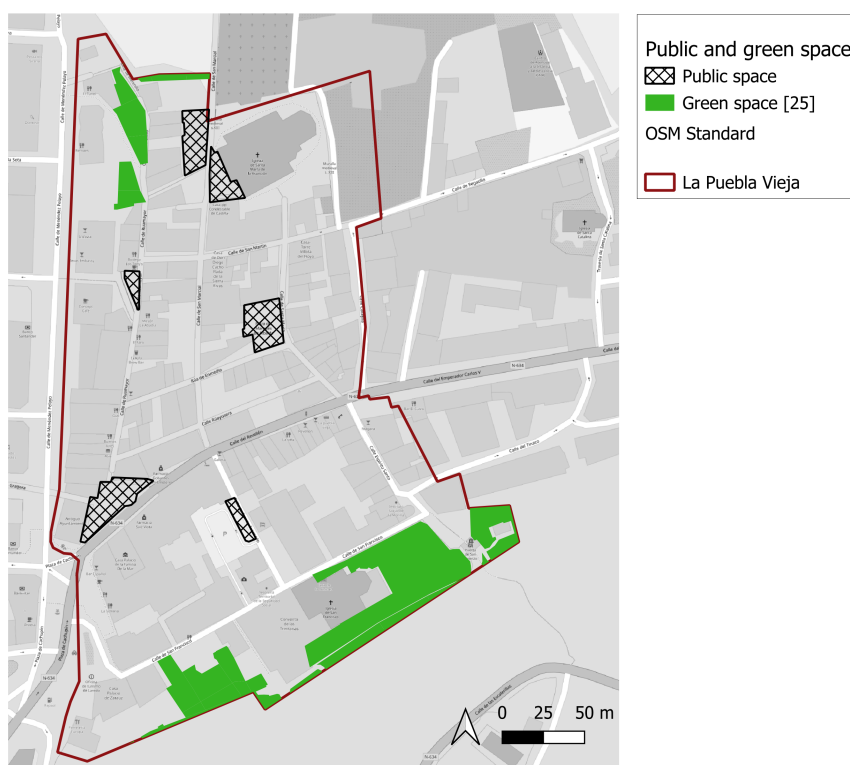


Figure 20 – Map of “La Puebla Vieja” of Laredo reflecting the location of public and green spaces.

► Green infrastructure / NBS

Puebla Vieja is an area with acceptable environmental conditions. The limited presence of vehicles (theoretically only residents and those with permits can circulate) contributes to this. However, there are potential

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improvements regarding the use of vegetation: the urban fabric is almost entirely stone and concrete, with very little green public space, which reduces the habitability of the environment.

In the northern area, at the boundary of Puebla Vieja with access to La Atalaya and the cliffs, there are environmentally significant elements that must be safeguarded. The western slope, in particular, is an area that needs protection and is also of interest for solving the comprehensive accessibility of the upper part of Puebla Vieja. Both objectives should be addressed together.

► Accessibility / Orography

La Puebla Vieja is situated on a gentle slope, unlike the rest of Laredo, which is on flatter land reclaimed from the sea. The northern part of La Puebla Vieja is primarily accessed via stairs, while the southern part has level pedestrian access without inclines. Improving pedestrian accessibility to the northern part of La Puebla Vieja is a priority. This area has seven access points, all with slopes exceeding 9%, and is dominated by the church of Santa María de la Asunción. Access mainly involves stairs, posing challenges for people with mobility issues. The stairs are a key focus for urban accessibility improvements. There is a collective awareness of this issue, and temporary solutions have been implemented in recent years. The current infrastructure can become slippery in adverse weather due to cobblestone and polished stone materials, and the varying gradients and steps with different pavements further complicate accessibility.

The pedestrian access from Calle Menéndez Pelayo is the most challenging in terms of accessibility due to the significant height difference between the avenue and the historic centre. Despite several projects and initiatives over the years, the accessibility issues remain unresolved. In contrast, pedestrian accessibility to the southern part of La Puebla Vieja is easier due to more favourable terrain and different paving, which reduces barriers for people with mobility issues. However, the combined pedestrian and motorized access to the medical centre via San Francisco Street is a major conflict point. This narrow one-way street requires pedestrians and vehicles to share space, leading to conflicts due to narrow sidewalks and high traffic volume. Although the street is designed for pedestrian priority, this is not always observed, necessitating attention to this issue.

Pedestrians face accessibility issues on El Regatillo street, which connects La Puebla Vieja with the Church of San Martín and Santa Catalina. This narrow one-way road lacks segregated pedestrian space, except for an elevated stone platform needing review or intervention. Alternatives and solutions for vehicular access to the cemetery and parking are being studied. The “Laredo Ciudad Amigable” study identified four key accessibility

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points for the older people: the church and cemetery area, the public medical centre, and the Casa del Mar.

► Mobility characterisation

Mobility through the historic town is mainly walking, although the slopes and the irregular pavement make this walkability not always easy.

Additionally, the N-634 highway, a main entry route from the A-8 highway, divides La Puebla Vieja into north and south. It connects the historic town with the rest of Laredo and is a single-lane road with traffic light regulations, handling high traffic volumes. This area, being the main commercial zone, faces vehicle-pedestrian conflicts due to narrow sidewalks.

Inhabitants (and suppliers) have permission to access the historic town by car, so this access is limited by a bollard at the entrance of Calle Santa María, which has a license plate recognition system. This allows for loading and unloading at certain times of the day and for residents to enter with private vehicles.

Vehicular access and parking in La Puebla Vieja is an important issue that requires a comprehensive response. Generally, most streets are pedestrian or shared spaces, where resident vehicles coexist in some cases, and in others, local residents access services located in La Puebla Vieja (such as the medical centre).

3.2.1.3 Infrastructures and services (ICT, public equipment, etc.)

Regarding infrastructure and services, there are issues with the electrical (low voltage) and telecommunications wiring attached to building facades, as well as the inconsistent and inappropriate signage that does not align with the heritage characteristics of Puebla Vieja. Additionally, there is inadequate lighting, a concern also raised by social agents. The current lighting is perceived as insufficient and creates a sense of insecurity in some areas.

Another recent issue is the deployment of fiber optic infrastructure in Puebla Vieja. While it is being installed, it also involves additional wiring on facades, which has faced opposition from residents. There are also problems stemming from outdated water infrastructure and the poor condition of the associated shut-off valves. As is common in historic centres, there are challenges with waste collection.

All these issues are being addressed in detail in the Special Plan currently being updated, with the original plan dating back to 1999.

► Existing public and private services in the area

As for community facilities both public and private, there is a need to enhance La Puebla Vieja through new and innovative uses. In recent years, measures have been taken to transform the urban leisure landscape (bars, nightclubs) into other cultural or institutional uses. The inherent characteristics of a heritage environment of great cultural value like La Puebla Vieja, as well as its buildings of high heritage value, make this need for facilities a challenge. There are some services such as the Institute of Social Services (located in the Casa del Mar), a Senior Centre, and the Health Center.

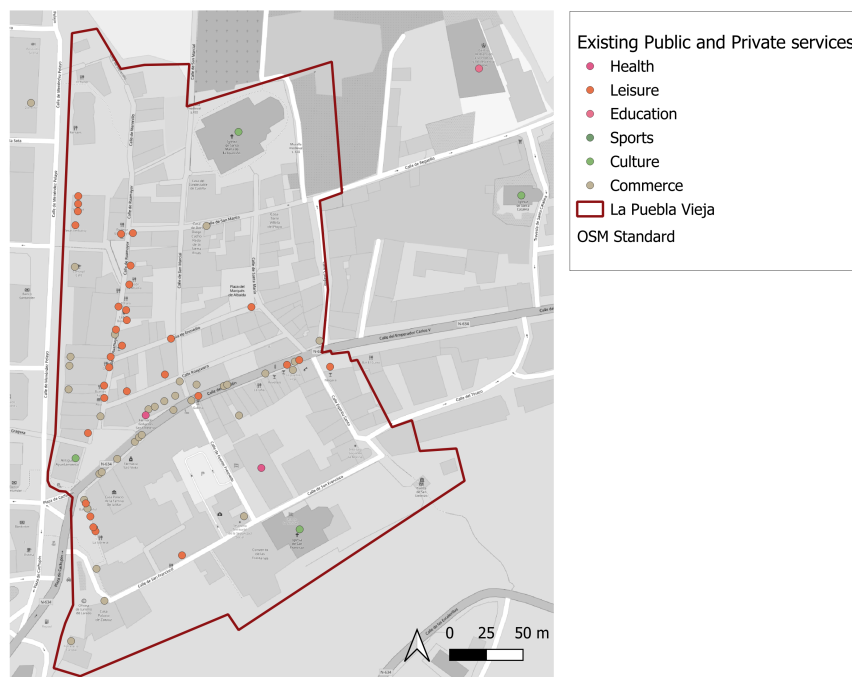


Figure 21 – Map of “La Puebla Vieja” of Laredo reflecting the location of public and private services.

► Economic activities in the area

During the 1960s and 1970s, the rise of Laredo as a tourist destination transformed La Puebla Vieja into an area predominantly dedicated to socializing, leisure, and entertainment. This changed in the 1980s, as it became a deteriorated and declining area due to the proliferation of nighttime activities, which negatively impacted the demographic, social, and functional profile of the area.

However, in recent years, efforts have been focused not only by the municipal team but also by neighbourhood associations to reduce nighttime activity in the Puebla Vieja, achieving the renovation of the urban

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environment of the historic centre with the joint interest of the residents and municipal authorities.

A detailed analysis of the economic activities shows a majority of the historic town focused on hospitality and restaurant activities, followed by local commerce. This is illustrated in the following figure of geographical distribution of economic activities.

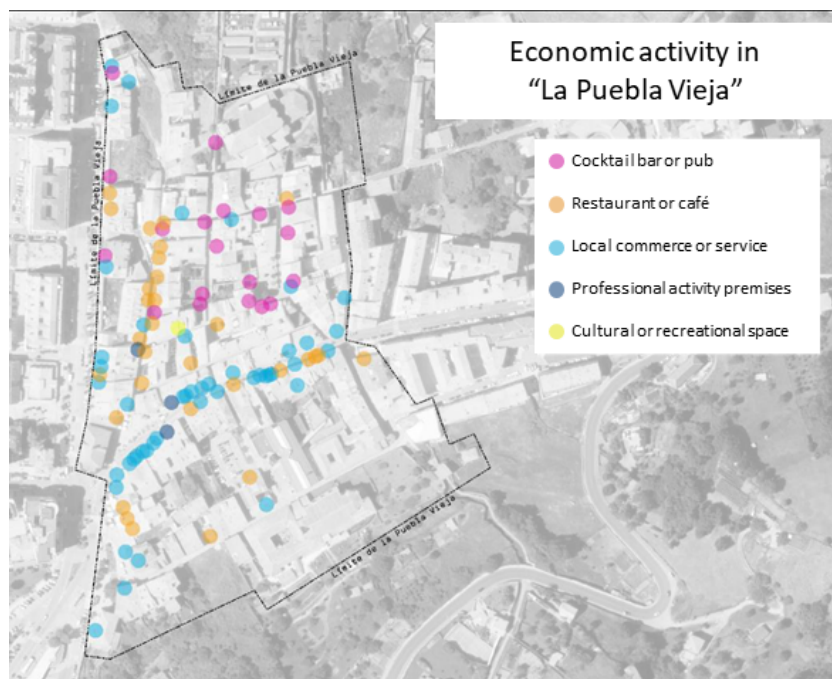


Figure 22 – Overview of the location of economic activity in Puebla Vieja

3.2.2 Socio-economic characterization

3.2.2.1 Residents' socio-economic profile

The municipality of Laredo has experienced a progressive population decline since 2006, losing 2,092 inhabitants compared to 2005. This decline may be due to a lack of affordable housing for young people, who move to more accessible nearby areas, and the seasonal nature of employment in the service sector, driven by the population surge in summer due to tourism.

It is interesting to note that during the summer or holiday periods, the population is estimated to reach from 10.849 (2023) up to 90,000. Two out of ten inhabitants of Laredo lived in the historic centre in 2010, while currently, according to municipal register data, the percentage of residents in La Puebla Vieja does not exceed 8% of the total population of the municipality.

The population data for La Puebla Vieja is limited due to the available public information being aggregated by census sections, which include other parts of the municipality. However, interviews with key agents and a qualitative study of social needs in 2017 suggest a trend of depopulation. This trend is attributed to living conditions, such as accessibility issues, dampness, lack of

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modern amenities, need for rehabilitation, and disturbances from predominant nighttime activities. Most residents, except for a few, are unable to move to other areas of the municipality.

In 2021, statistical analysis of the municipal register showed that Puebla Vieja had 906 residents, with 427 men and 479 women, making up 47% and 53% of the population, respectively. The gender ratio is fairly balanced in the most populated streets, but some streets like Menéndez Pelayo and Plaza Cachupín have a higher percentage of women. Compared to the 2010 ARI data, which recorded 2,844 inhabitants, there has been a significant population decline of 68% over the last decade. The area has a considerable elderly population (20%), though this is below the municipal average of 27%. The majority of the population (69%) is between 18 and 64 years old.

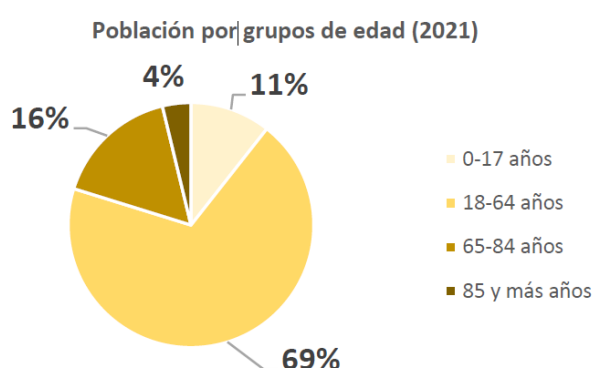


Figure 23 – Population of Puebla Vieja by age groups. Source: Municipal Register

Regarding unemployment variables, while 10% of Laredo's population is unemployed, this rate rises to 20% in Puebla Vieja. The diagnosis made in the 1999 Special Plan for the historic town remains valid today, to the point that some of the aspects mentioned there have generally become more pronounced over the past two decades: *"There is also an evident interrelationship between centrality, accessibility, urban quality, and the qualification of commerce and urban and professional services. Acting on these variables (aging, accessibility, centrality, urban quality)."*

3.2.2.2 Citizen and stakeholders' engagement

The revitalization and preservation of La Puebla Vieja, Laredo's historic centre, hinges on an inclusive approach that brings together various actors from political, technical, cultural, and community spheres. These stakeholders contribute distinct perspectives and expertise, fostering a collaborative environment essential for the success of the REGEN project and related initiatives.

The Municipality of Laredo, in collaboration with the Government of Cantabria, plays a central role in steering the development of La Puebla

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Vieja. Political representatives and institutional bodies provide strategic direction, secure funding, and oversee the execution of projects that enhance urban infrastructure and preserve cultural heritage. Examples of their collaborative efforts include the construction of affordable rental housing and the installation of accessibility solutions like mechanised ramps, which are crucial for the inclusivity of this historic area.

Key technical actors, such as municipal architects, urban planners, and engineers, contribute invaluable knowledge to address the architectural and structural needs of La Puebla Vieja. These experts ensure that interventions respect the historical and cultural significance of the area while meeting modern standards for safety, energy efficiency, and accessibility.

Cultural and civic organizations are fundamental to preserving and promoting the identity of La Puebla Vieja. Local businesses, ranging from long-standing family-owned shops to newer ventures, are key to the economic and social vitality of La Puebla Vieja. Their presence not only sustains daily life in the area but also attracts visitors and creates opportunities for community interaction. Religious and community leaders also play significant roles in maintaining the social cohesion of the area. Organizations dedicated to social inclusion are crucial for fostering a sense of community and addressing the unique needs of vulnerable populations within La Puebla Vieja.

The engagement of these diverse stakeholders demonstrates the importance of a holistic and inclusive approach to revitalizing La Puebla Vieja. Political leadership, technical expertise, cultural advocacy, and active community participation collectively ensure the sustainable preservation of this historic neighbourhood. By embracing collaboration and leveraging the strengths of each group, Laredo can overcome the challenges of population decline, economic shifts, and architectural neglect, transforming La Puebla Vieja into a vibrant, accessible, and cherished part of the town's identity.

Previous initiatives by the Laredo Town Council, such as the REPUEBLA project, have demonstrated a commitment to fostering citizen participation in the development and revitalization of La Puebla Vieja. These efforts reflect the municipality's recognition of the critical role that community engagement plays in achieving sustainable and inclusive urban regeneration. The REPUEBLA project served as a platform for dialogue between residents, technical experts, and local authorities, emphasizing the importance of collective decision-making. The Town Council remains steadfast in its approach, acknowledging that active involvement from all stakeholders is essential to preserving the cultural heritage of La Puebla Vieja while addressing contemporary urban challenges. This participatory

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ethos continues to guide its current and future initiatives, ensuring alignment with the needs and aspirations of the community.

- Map existing or past relevant initiatives in citizen participation or social cohesion.

Laredo Town Council has a Citizen Participation Ordinance (2016) that regulates the information and participation of citizens in relation to local management. The ordinance responds to a formal regulation and is not fully developed, although the municipality has a transparency website which shows the open participatory processes (mainly ordinances and urban planning), their documentation and the channel for citizens to participate.

The municipality has explored participatory initiatives such as participatory budgeting in 2021. It is also worth highlighting the participatory process carried out in RE-Puebla, the germ of the process that we will continue in REGEN, and which could contribute to the development of participatory tools such as a Municipal Council for Participation or a Sectoral Council for the Puebla Vieja.

- Identify relevant cultural stakeholders and cultural initiatives (past or current)

The main cultural stakeholders identified are:

- The Friends of Laredo Heritage Association (Asociación de Amigos del Patrimonio de Laredo) a socio-cultural and non-profit organisation whose objectives include promoting and disseminating knowledge of the historical roots of the town of Laredo as well as the conservation and defence of its cultural heritage in the broadest sense. They carried out different activities around the Puebla Vieja and participated in the RE-Puebla initiative.
- The University of Cantabria through the Summer Courses programme. This programming can be a multiplier for the dissemination and transmission of scientific and technical knowledge on the topics covered by the project in general and those specific to the Puebla Vieja.

On the other hand, the Puebla Vieja is an important part of the recreation of the last landing of Charles V. In the different editions, exhibitions and other events have been held, in addition to the summer opening of the Interpretation Centre of the event in the historic building of the Puerta de San Lorenzo.

In addition to the regular cultural programme throughout the year, there are various cultural initiatives that highlight the heritage of the Puebla Vieja, and that have been held during the last years although sometimes are just

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one-time initiatives that have not been replicated the following years such as:

- Old Town Hall Building: Mainly painting exhibitions in the upper floor room dedicated to internationally recognized artists, highlighting the work of promoting Cantabrian artists, while the lower floor room is more oriented towards general cultural activities and open to more local groups.
- Mural Painting Volunteer Campaign in the Puebla Vieja.
- Cultural events in the Atalaya site during the months of July and August. A cultural program that emerged in 2015 (Atalaya on Air) and has now been enhanced with concerts and performances.
- "Parallel Arts" Festival, promoted by the City Council with various cultural associations, where activities have been carried out in municipal facilities, but also in other spaces such as the Ruas Hall or some vacant lots in the Puebla Vieja. Notably, within the framework of this Parallel Arts Festival, a very interesting initiative was developed in 2016 that had the Puebla Vieja as its absolute protagonist. The "Vive" initiative aimed to create an extraordinary place from a ruined urban space.
- "Laredo Light Festival 2021", held in September 2021 for the first and only time, with activities distributed across different locations in Laredo (including the Puebla Vieja). It focuses on video mapping and musical and lighting resources to create shows that could be enjoyed for free. The organization's commitment to the Arts Baccalaureate students of IES Bernardino Escalante stands out, offering training in arts and bringing culture and art closer through the educational window.
- Concert cycles held in the Church of Santa María within the cultural programming of the city council.
- Free guided tourism routes specialized in the Church of Santa María and extending to the rest of the Puebla Vieja.

4 Milan demo site

Milan is structured into several distinct areas, including the historic city centre, the vibrant modern districts, and the diverse suburban neighbourhoods. It is Italy's administrative, commercial, and trading hub, as well as a major centre of education and culture.

The REGEN project focuses on data analysis and software management, targeting two distinct areas within the neighbourhood. The first area, on a large scale, covers the entire Giambellino-Lorenteggio neighbourhood, while the second area zooms in on three buildings on Via Giaggioli. These areas are outlined in light red and dark red, respectively, in the lower figure, for detailed analysis and intervention.

4.1 Territorial characterization

Milan is the largest city in northern Italy and the capital of the Lombardy region. Geographically situated in the Po Valley, Milan covers an area of about 181 square kilometres (70 square miles). The city lies between the Alps to the north and the Apennine Mountains to the south, with the Adda and Ticino rivers flowing nearby.

Milan is characterized by an intricate network of canals, some covered, including the renowned Naviglio Grande, which has historically served as vital trade routes.

The city enjoys a humid subtropical climate, bringing warm summers with temperatures often reaching around 30°C (86°F). This pleasant weather encourages outdoor activities, making the many parks and open spaces popular gathering spots for relaxation and socializing. In contrast, winters can be cool, with temperatures occasionally dipping near freezing, creating a cozy atmosphere during the festive season.

Despite its urban landscape, Milan boasts numerous green spaces that provide a breath of fresh air amidst the city bustle. Parks such as Sempione Park and the Giardini Pubblici are cherished by the community, offering tranquil retreats for leisure and recreation. These natural areas play a vital role in enhancing the quality of life for residents and supporting local biodiversity.

Due to geographical location and lack of wind, air pollution is an issue although slowly decreasing in the last years. The main pollutant is fine dust (so called micro particulate, - 2,5 and 10 micron) which is a result of city mobility. To improve air quality as to comply with international standards and total reach carbon neutrality in 2050, the municipality adopted a strategic plan Piano Aria e Clima (Air and Climate Plan).

► Natural & geographical characteristics



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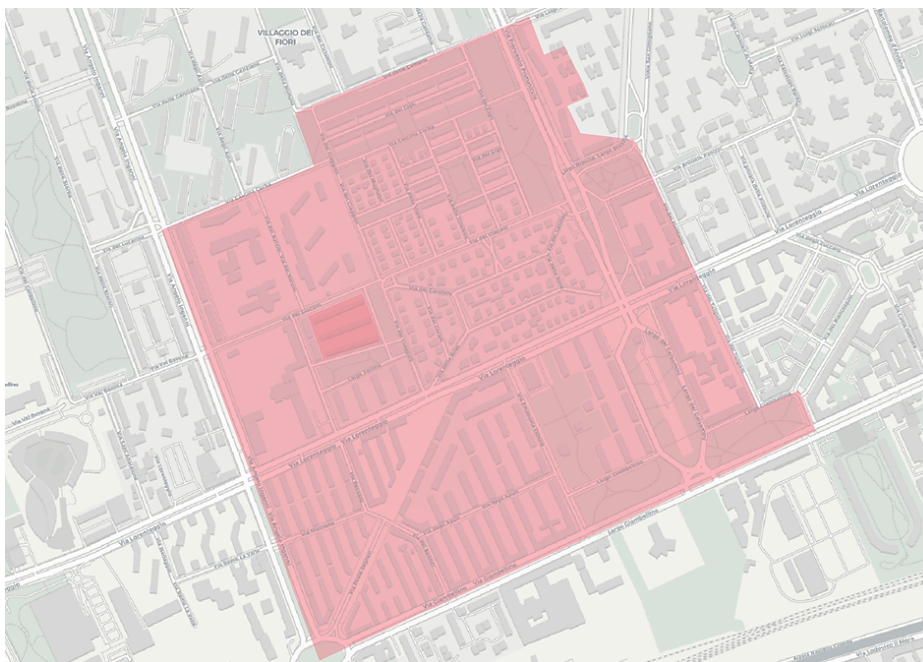


Figure 25 - Location of the REGEN Milan pilot project, within the Giambellino-Lorenteggio neighbourhood.

Within the Giambellino-Lorenteggio neighbourhood lies the REGEN Milan pilot project, located near Lorenteggio Street and Via dei Giaggioli.

The area is characterized by its abundance of green spaces. The map below highlights the permeable areas within the study region. Analysis reveals that, out of a total surface area of 649,070 square meters, more than 33%—equivalent to 217,808 square meters—is permeable. This indicates that a significant portion of the land facilitates natural water infiltration.

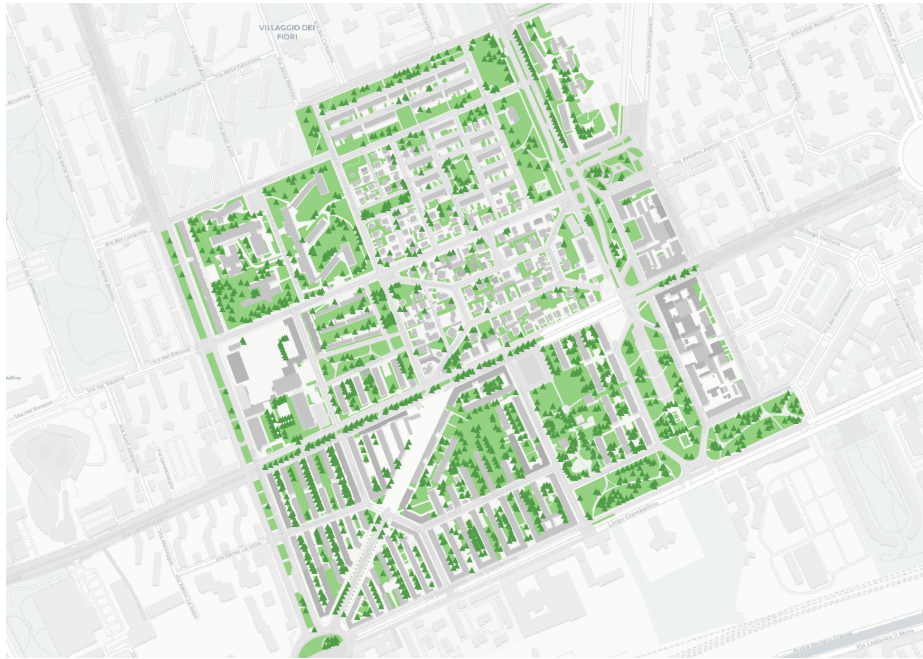


Figure 26 – Green areas of Giambellino-Lorenteggio neighbourhood. Source: AMAT.

The Giambellino-Lorenteggio neighbourhood has a variety of environmental conditions, with some opportunities for improvement in terms of green infrastructure and Nature-Based Solutions (NBS). The neighbourhood's existing urban fabric consists largely of buildings, roads, and paved areas, with limited green public spaces. This lack of vegetation reduces the overall quality of life and environmental resilience, particularly in terms of air quality and heat mitigation.

However, there are areas within Giambellino-Lorenteggio that offer significant potential for green interventions. For instance, the spaces along the western side of the neighbourhood, which are closer to open areas, could benefit from the introduction of more vegetation, creating cooling zones and improving urban biodiversity. Additionally, integrating nature-based solutions such as green roofs, urban parks, and tree planting in underutilized spaces would greatly enhance the area's environmental conditions.

There is also a need to focus on improving accessibility and connectivity between the green spaces and the surrounding neighbourhoods. This could be achieved by creating pedestrian pathways and bike lanes that link the urban green areas, encouraging both environmental and social sustainability.

By integrating green infrastructure and NBS into the urban planning of Giambellino-Lorenteggio, we can create a more sustainable, resilient, and

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livable neighbourhood that enhances the quality of life for residents and visitors alike.

► Infrastructures and services (ICT, public equipment, etc.)

This neighbourhood in Milan is an area characterized by a network of cultural and recreational infrastructures, including libraries, schools and parks of various scales, some of which are green areas where you can practice sports. These facilities play a crucial role in the daily lives of residents, offering spaces for education, recreation, and community engagement.

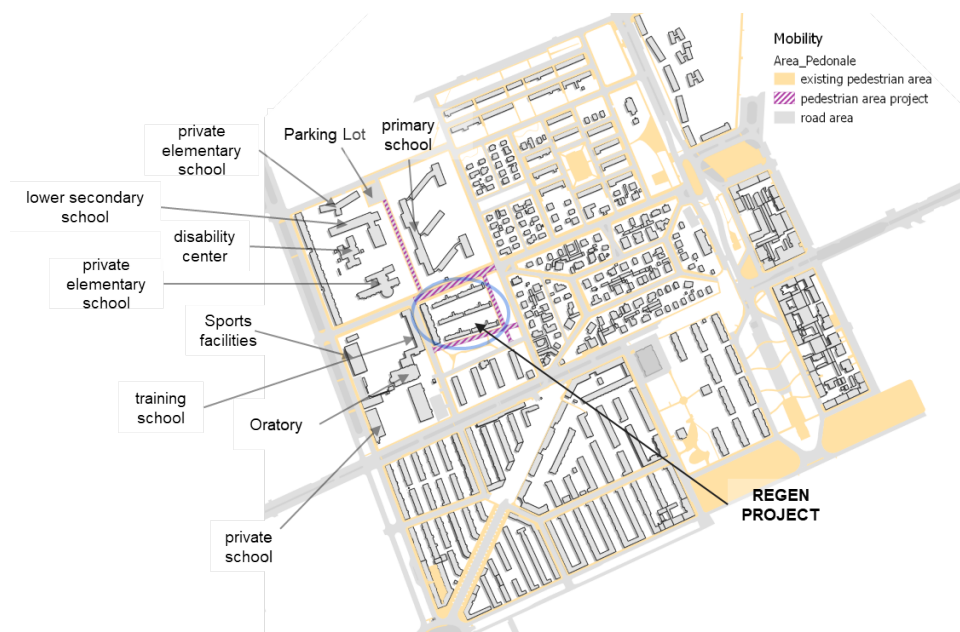


Figure 27 – Different types of institutions. Source: AMAT.

As part of ongoing regeneration efforts, the neighbourhood is set to experience significant infrastructure enhancements. A key development is the construction of the M4 Segneri underground station, which will greatly improve public transport connectivity, making it easier for residents to access other parts of the city.

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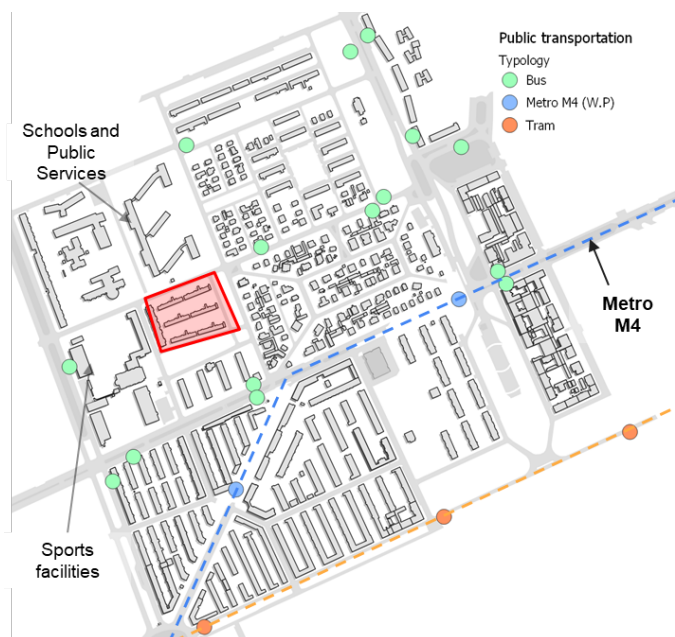


Figure 28 – Transportation links between the Giambellino-Lorenteggio area and the city of Milan. Source: AMAT.

In addition to transport upgrades, the neighbourhood's ICT infrastructure will be improved to support smart city initiatives. These upgrades aim to enhance public services and accessibility, aligning with Milan's broader push towards becoming a more connected and technologically advanced city.

The regeneration plan also includes a focus on public spaces, with the creation of new green systems and pedestrian areas. One of the highlights will be a new cultural park, designed to foster a deeper connection between humans and nature. This park will not only serve as a recreational space but also as a cultural hub, reflecting the city's commitment to sustainability and enhancing the quality of life in Giambellino-Lorenteggio.

Overall, these developments will significantly enrich the neighbourhood, making it a more liveable, sustainable, and culturally vibrant part of Milan.

► Building stock and retrofitting needs

The neighbourhood features a variety of building typologies, ranging from public housing blocks to more recent residential complexes. Buildings from the 1950s and 1960s predominantly consist of medium-sized condominiums, typically five or six stories tall, with small, functional apartments designed to meet the housing needs of the working class and lower middle class.

The map below illustrates the spatial distribution of buildings based on their year of construction.

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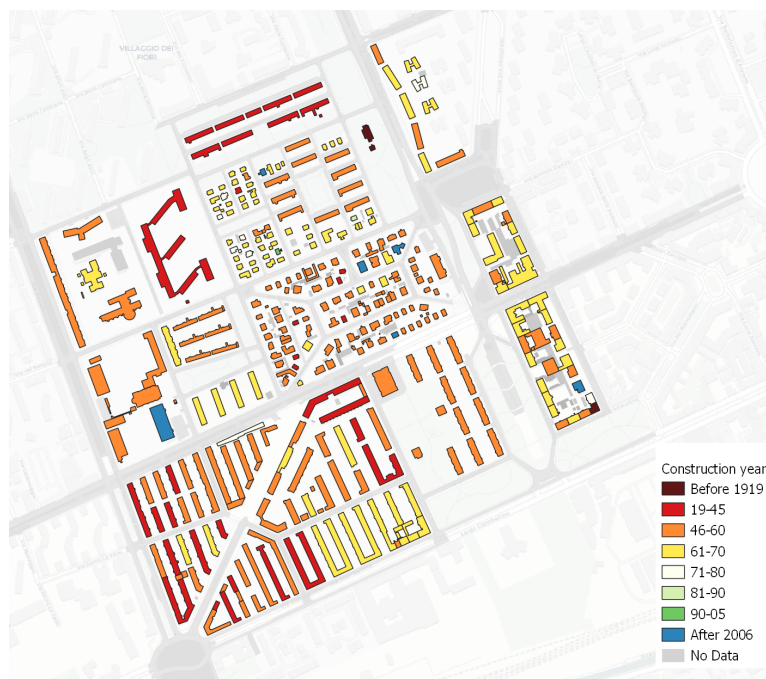


Figure 29 – Construction year of the Giambellino-Lorenteggio buildings. Source: AMAT.

The study area's most prominent construction period is between 1945 and 1960, a time marked by reconstruction and urban development following World War II. This time frame reflects the significant building activity that took place during the post-war period, as can be clearly seen in the graph.

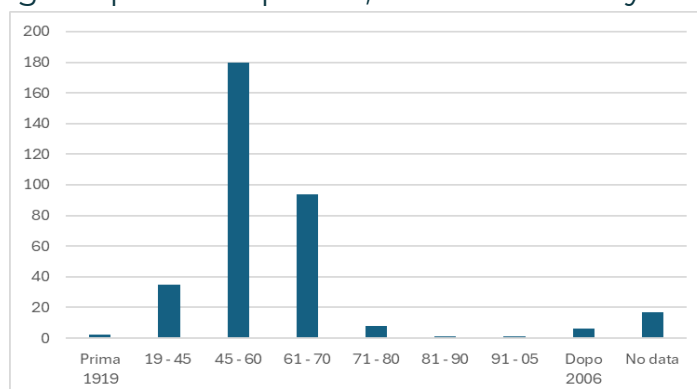


Figure 30 – Number of buildings by year of construction. Source: AMAT.

In recent decades, the neighbourhood has undergone several refurbishment efforts, both public and private, but the refurbishment rate remains relatively low compared to other areas of Milan. Many buildings still require improvements for energy efficiency and structural safety, with efforts focusing on preserving the neighbourhood's historical character while enhancing living conditions.

Overall, Giambellino-Lorenteggio reflects the social and economic transformations of Milan throughout the 20th century, with a strong

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historical identity supported by its diverse architectural heritage and protected buildings.

► Energy supply and consuming patterns

One of the primary goals of the regeneration project is to address energy poverty in the neighbourhood. The existing buildings are highly energy-inefficient and lack modern amenities such as air conditioning. The new constructions will feature energy-efficient designs, reducing both energy demand and consumption.

Additionally, the regeneration plan includes the integration of clean energy sources and sustainable materials, aligning with Milan's commitment to reducing carbon emissions and promoting energy sustainability. The map below illustrates the primary sources of fuel used in the buildings.

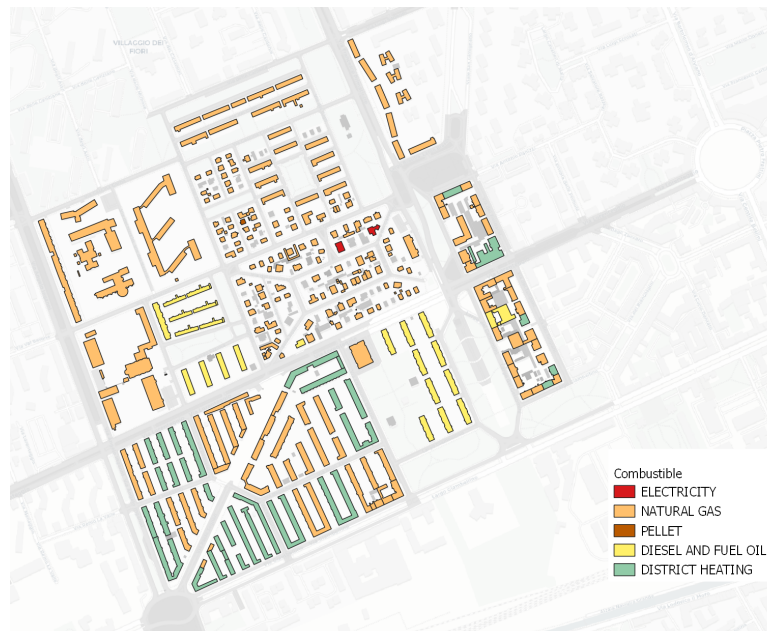


Figure 31 – The map illustrates the variety of fuels used by buildings within the study area. Source: AMAT.

The chart below shows that natural gas is by far the most used fuel, as is the case in all Milan city.

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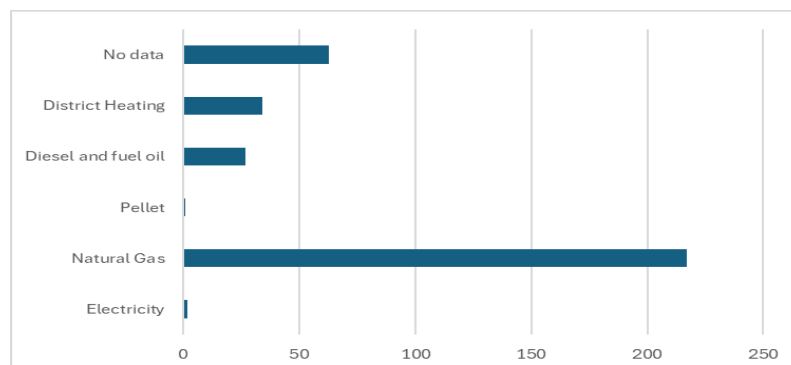


Figure 32 – Different energy uses in the city of Milan. The x-axis represents the number of dwellings in the sector. Source: AMAT.

► Mobility & accessibility

Mobility and accessibility in the Giambellino-Lorenteggio neighbourhood will be significantly enhanced through the regeneration project. The introduction of new cycling lanes, pedestrian streets, and green corridors will promote sustainable mobility. The reduction of parking spaces and the creation of walkable areas will improve accessibility and reduce the neighbourhood's reliance on cars. These changes are part of Milan's broader strategy to ensure that 70% of its population lives within a 15-minute walking distance from green or blue areas, promoting a healthier and more connected urban environment.

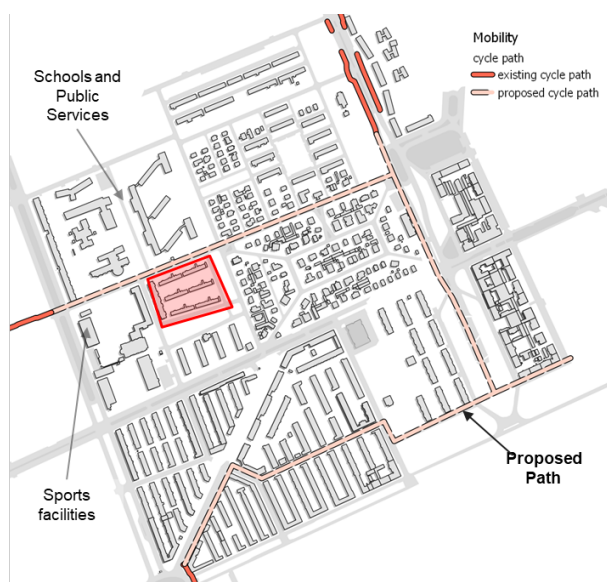


Figure 33 – Extension of the bike lane and location of schools in the area. Source: AMAT.

4.1.2 Socio-economic characterization

- Socio-economic profile

Milan is recognized as the financial heart of Italy. The city's economy is multifaceted, with key sectors including finance, fashion, technology, and manufacturing. Milan contributes significantly to the national GDP and is a centre for innovation, attracting talent from across the globe.

With a population of approximately 1.4 million, Milan is the second-largest city in Italy. The metropolitan area exceeds 3 million residents, showcasing a vibrant mix of cultures. Over the years, the demographic landscape has evolved significantly, particularly due to immigration. The city has welcomed people from various regions, contributing to its multicultural identity.

Despite its economic strengths, Milan faces several social challenges. Issues such as housing affordability, social inequality, and unemployment persist, impacting various segments of the population. The rapid increase in real estate prices has made it difficult for many residents, especially those in lower-income brackets, to find affordable housing. Additionally, marginalized communities often experience limited access to quality education and employment opportunities.

The city is actively working to address these challenges through various initiatives aimed at fostering social inclusion and community engagement. Efforts to improve public services, enhance housing accessibility, and promote educational opportunities are ongoing as Milan strives to create a more equitable environment for all its residents.

Giambellino and Lorenteggio are two interconnected neighbourhoods in Milan that share a rich history and a dynamic socio-economic landscape. Giambellino emerged in the early 20th century as an extension of the industrial area around Porta Genova, benefiting from its proximity to the Naviglio Grande and the Milan-Mortara railway. Initially characterized by public housing that reflected a strong working-class foundation, Giambellino became a vital destination for immigrants from various regions, with factories shaping its identity through a deep sense of professional pride and solidarity.

Lorenteggio has a similarly storied past. Once a rural area, it gradually transformed into an urban neighbourhood, particularly after World War II, as the city expanded, and industrial activity increased. Lorenteggio has its own blend of residential and commercial spaces, attracting diverse populations over the years, contributing to a rich cultural tapestry.

D3.1 - Diagnosis and Baseline for all the demo sites

In the post-war period, both neighbourhoods saw an influx of more affluent residents due to their location near the city centre and the development of public transport infrastructure, including the metro. This demographic shift led to significant growth while still retaining a considerable amount of public housing. The interplay between socio-economic backgrounds in both Giambellino and Lorenteggio fostered a vibrant community, with local institutions such as schools, churches, and cultural centres serving as hubs for interaction and collaboration.

Despite facing common challenges such as poverty, social issues, and housing instability, both neighbourhoods have been proactive in addressing concerns like drug addiction and school dropouts through community initiatives. The historic culture of solidarity remains strong, allowing residents to maintain close community ties and support systems, even as they navigate the complexities of urban change.

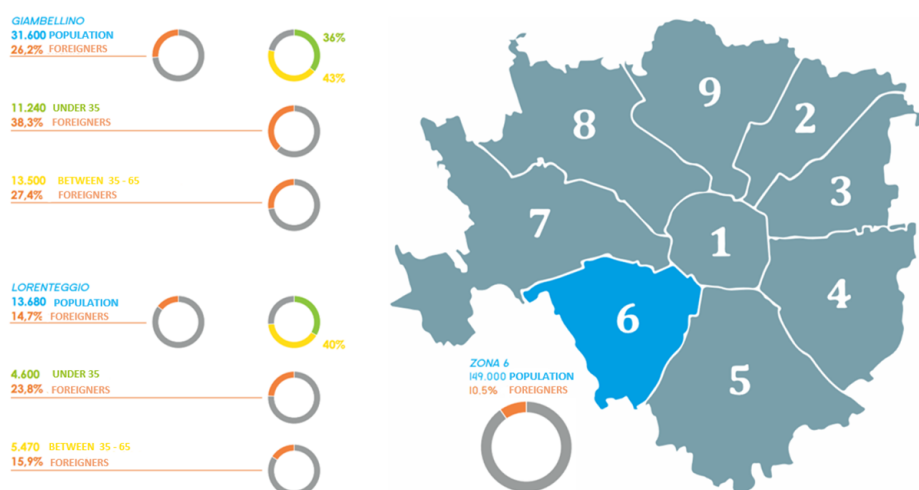


Figure 34 – Comparison Municipio 6 with Milan area. Source: Municipality of Milan.

The population residing in the study area amounts to 8,629 inhabitants. Below is a map highlighting the distribution of the resident population, with areas of higher concentration shown in red and less populated areas represented in light green.



Figure 35 – Distribution of residents in the neighbourhood. Source: AMAT.

► Citizen and stakeholders' engagement

The City of Milan actively promotes citizen and stakeholder participation through various initiatives, including the Air and Climate Plan, the Department of Participation, and innovative European projects.

The Air and Climate Plan incorporates key elements such as the Assembly of Citizens and the "Milano Cambia Aria" website, both aimed at engaging the community in addressing air quality and climate change. The Department of Environment organizes the Milan Green Week, further enhancing public awareness and involvement.

The Department of Participation plays a crucial role in facilitating dialogue and collaboration among citizens, providing platforms for input on environmental policies. Additionally, initiatives in urban regeneration and sustainable mobility aim to create a more liveable city. Workshops and community consultations allow residents to contribute to plans for improving public transport and public spaces.

All of these participatory processes are governed by the Regulation on Participatory Rights for the citizens of Milan, established by the Municipality in 2016.

European projects complement these efforts, focusing on enhancing the quality of life for citizens and strengthening the communities that enrich Milan. These initiatives foster collaboration among residents, experts, and local organizations to develop innovative solutions for urban challenges.

D3.1 - Diagnosis and Baseline for all the demo sites

This section outlines the importance of identifying which stakeholders should be engaged in the study area to develop a comprehensive stakeholder map. This process is essential for understanding the dynamics of influence and collaboration among the various key actors.

Residents and Community Members

Homeowners
Renters
Local community groups
Vulnerable groups (e.g., elderly, low-income families, **non native communities**)

Non-Governmental Organizations (NGOs) and Non-Profits

Community development organizations
Environmental groups
Social services organizations
Cultural and heritage organizations

Local Businesses and Commercial Interests

Small businesses
Large corporations
Local business associations
Property owners and landlords

Financial Stakeholders

Trusts, Banks and financial institutions
Investors
Real estate developers

Educational Institutions

Schools
Colleges and universities
Research institutes

Government and Public Sector

Local government (city council, municipal departments)
Regional government authorities
Public service providers (e.g., **nursery**, healthcare facilities)
Law enforcement agencies

Professionals and Experts

Urban planners
Architects
Engineers
Environmental consultants

Media and Communication Outlets

Local newspapers
Online news platforms
Community radio stations
Social media influencers

► Cultural and creative ecosystem

The **Giambellino-Lorenteggio** neighbourhood in Milan offers a rich array of cultural activities that strengthen the local community, promote social cohesion, and provide spaces for creative expression. Many of these initiatives are led by the **Laboratorio di Quartiere Giambellino-Lorenteggio**, along with local associations and cultural centres. Here's a summary of some key activities:

Neighbourhood Festivals: Annual festivals bring residents together with concerts, outdoor film screenings, and art exhibitions, creating spaces for community interaction and public engagement.

Creative Workshops: Local associations offer creative workshops, such as painting, theatre, and photography, providing opportunities for artistic development and social inclusion.

Outdoor Cinema: Popular summer movie nights, with free screenings in parks, focus on social and cultural themes, often showcasing independent films and documentaries.

Libraries and Reading Events: **Biblioteca Lorenteggio** organizes public readings, author talks, and creative writing workshops, fostering a love for literature and storytelling in the community.

Public Art Projects: Public art initiatives, including murals created by local and international artists, visually enrich the neighbourhood and tell its historical and social stories.

D3.1 - Diagnosis and Baseline for all the demo sites

Music Spaces: Cultural centres like **Barrio's** host concerts, jam sessions, and music workshops, offering young people opportunities to learn and perform.

Children and Family Activities: Seasonal events such as Carnival and Spring Festivals include creative workshops, theatre, and games, engaging families and children.

Multicultural Events: Given the area's diversity, many events celebrate different cultures through food, music, and dance, promoting inclusion and intercultural dialogue.

Historical Memory Projects: Projects focused on the neighbourhood's history include exhibitions, oral history interviews, and guided tours that explore Giambellino-Lorenteggio's social movements and transformation.

► Economic ecosystem

Giambellino-Lorenteggio neighbourhood is characterized by a mix of small businesses, informal economies, and social enterprises. Historically a working-class area, it has a strong presence of local shops, artisans, and service providers catering to the community's needs. Recent urban regeneration efforts aim to boost entrepreneurship and attract new investments, focusing on inclusive growth and sustainability. The area is also home to various cultural initiatives and grassroots organizations that contribute to its social and economic vitality, while ongoing redevelopment seeks to balance modernization with preserving its local identity.

4.2 Intervention area

4.2.1 Physical characterization

The REGEN project will target three social housing complexes owned by the Municipality of Milan, situated in Via dei Giaggioli, covering a total area of 23,000 sqm. Built between 1952 and 1961 to provide affordable housing for low-income families, these structures (comprising three blocks with two modules each) no longer meet current building regulations. Consequently, they will be dismantled and replaced with new constructions that maintain the original external dimensions and capacity. This redevelopment offers a chance to enhance living conditions significantly, including the introduction of air conditioning systems, improved thermal and acoustic comfort, better accessibility, and reduced operational expenses for residents.

The design phase presents several challenges, such as ensuring energy efficiency and the integration of renewable energy sources, implementing sustainable material use and circular economy principles, promoting green mobility, and addressing resilience and climate adaptation.

D3.1 - Diagnosis and Baseline for all the demo sites

4.2.1.1 Building stock

The three buildings targeted for intervention in the project are part of a program developed in Milan called "CASE ECONOMICHE E CASE MINIME PER I SENZATETTO" (AFFORDABLE HOUSING AND MINIMAL HOUSING FOR THE HOMELESS) and were designed by Architect Arrigo Arrighetti within the ALER (Lombard Residential Housing Company of Milan) program, which is responsible for the construction, allocation, and maintenance of some of the public housing in Milan. The buildings date from 1952 to 1961.



Figure 36 – Floor plans and photographs of the Via dei Giaggioli buildings.
Source: AMAT.

The buildings consist of three structures, including two modular linear buildings with a balcony-access typology. Each modular building contains 35 two-room apartments, for a total of 210 apartments, including 3 caretaker apartments. The number of above-ground floors is 5. The buildings were constructed during different periods, providing an overview of the urban development of the region.

D3.1 - Diagnosis and Baseline for all the demo sites

The buildings on Via dei Giaggioli, dating back to 1962, have been a significant part of the area, but they are now being demolished to make way for a more sustainable redevelopment project.

The demolition of the buildings on Via dei Giaggioli has recently begun, and the new project involves the construction of three new residential buildings residential buildings with commercial spaces on the ground floor and a new public space. That will meet high standards of sustainability and energy efficiency.

The ongoing project for the redevelopment of the Via dei Giaggioli area aims to create a new residential complex that includes green spaces, common areas and sustainable technologies.

► Energy and retrofitting characterization.

Existing buildings have a low energy efficiency profile, also due to lack of insulation and poor window frames, no energy metering and regulation system in place.

The new buildings will be NZEB (near zero energy buildings). They will be connected to efficient district heating for heating and domestic hot water, with radiant floor panels for heating and cooling. To save energy, dehumidifiers with static heat recovery for dehumidification and air changes are foreseen and smart metering with "user satellite", in each housing unit. Photovoltaic will be installed on the roof.

The results of the energy modelling are currently pending.

4.2.1.2 Public space and urban accessibility

The regeneration project in via dei Giaggioli prioritizes the enhancement of public space and urban accessibility. The area, currently impacted by a high solar reflectance index due to extensive asphalted surfaces such as roads and parking lots, will undergo significant transformations. Parking spaces will be reduced by 28 spots, and 1,750 sqm of asphalt will be removed to create new pedestrian-friendly areas, including 730 sqm of play spaces and pedestrian streets.

The existing drainage system, which is in poor condition, will be replaced to ensure better management of stormwater and align with Milan's broader urban sustainability goals. In addition, the project will introduce new cycling lanes, green corridors, and pedestrian streets, fostering sustainable mobility and reducing car dependency in the Giambellino-Lorenteggio neighbourhood.

D3.1 - Diagnosis and Baseline for all the demo sites

These interventions align with Milan's commitment under the C40 Urban Nature Accelerator to improve urban accessibility and quality of life. The city aims to ensure that 70% of its population resides within a 15-minute walk of green or blue areas and that 30-40% of its surface is permeable or green. The project will contribute to creating a healthier, more inclusive, and connected urban environment, significantly improving accessibility and public space use for residents.

► Green infrastructure / NBS

The space between the buildings includes a communal green area and a public park (open to all), which features native trees and various plants. However, the park currently lacks appropriate amenities, such as seating for relaxation or play equipment for children. This presents a great opportunity for improvement. By adding essential features like benches, shaded areas, and playgrounds, the park could be transformed into a more inviting and functional space. Enhancing this area would not only improve its usability but also foster social interaction, physical activity, and overall well-being for the community, making it a valuable asset for both residents and visitors.



Figure 37 – public and private green areas near the Via de Giaggioli buildings.

D3.1 - Diagnosis and Baseline for all the demo sites



Figure 38 – Private green area between two buildings (left) and public green area on Via dei Giaggioli (right).

► Mobility characterization

Mobility in the area will be revolutionized in the coming years, aligning closely with Milan's vision of a 15-Minute City, where essential services and amenities are accessible within a short walk or bike ride. Currently, the area is served by a bus network connecting it to the city's central areas, while the southern part of the study area benefits from more frequent train and tram connections. The near completion of the M4 metro line will provide a direct link between the study area and Milan's historic and economic centre, significantly enhancing accessibility and connectivity.

D3.1 - Diagnosis and Baseline for all the demo sites

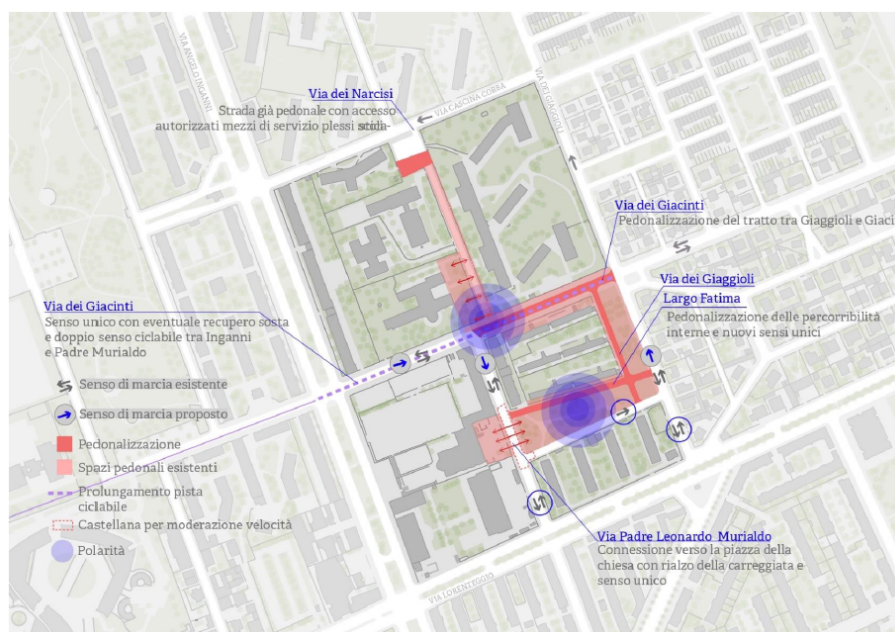


Figure 39 – Existing pedestrian areas (pink), new pedestrian zones (red), blue circles: a plurality of means of transport. Source: AMAT.

The 15-Minute City approach emphasizes walkability and the usability of public spaces, aspects reflected in the planned interventions within the area. The map above highlights the impact of pedestrian areas in the study area, demonstrating how these spaces contribute to a more sustainable urban environment. The upcoming transformation of Via Giaggioli will further enhance accessibility and the quality of pedestrian spaces, promoting sustainable mobility and efficient urban space use.

4.2.1.3 Infrastructures and services (ICT, public equipment, etc.)

The land use distribution in the study area clearly reveals a predominantly residential character, complemented by both public and private facilities, with schools being the most prominent.

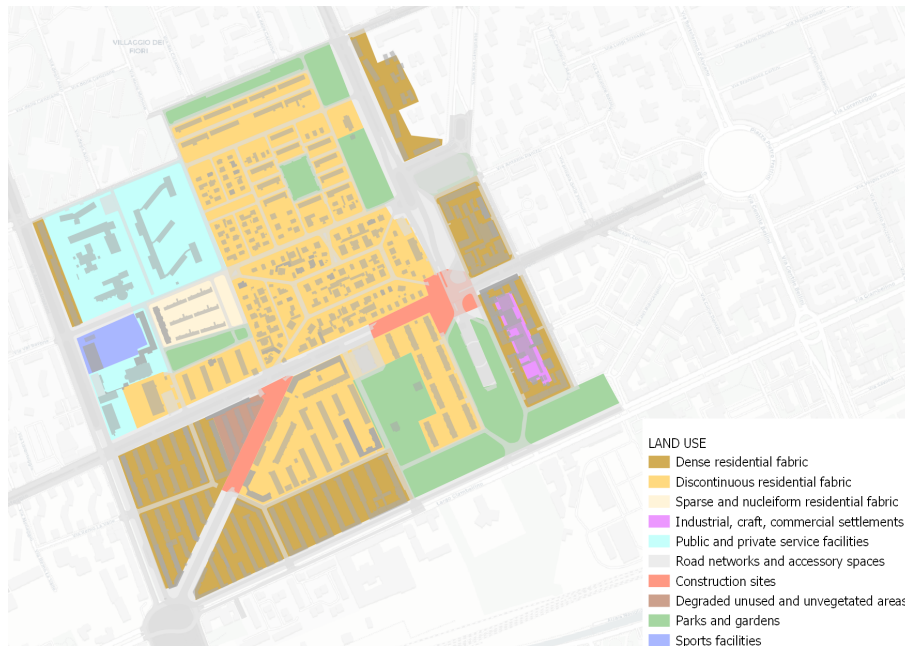


Figure 40 – Land use distribution in the area near the pilot buildings. Source: AMAT.

Commercial activities are limited, mainly concentrated in the eastern part of the area. Additionally, parks and gardens occupy a significant portion of the territory, enhancing the overall quality of life and access to green spaces.

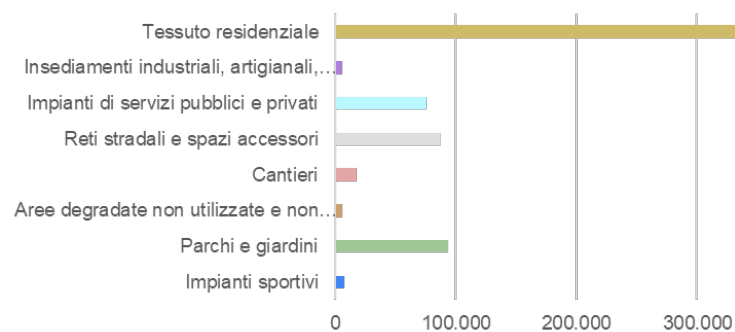


Figure 41 – Distribution of land use (m²) by type of use. Source: AMAT.

D3.1 - Diagnosis and Baseline for all the demo sites

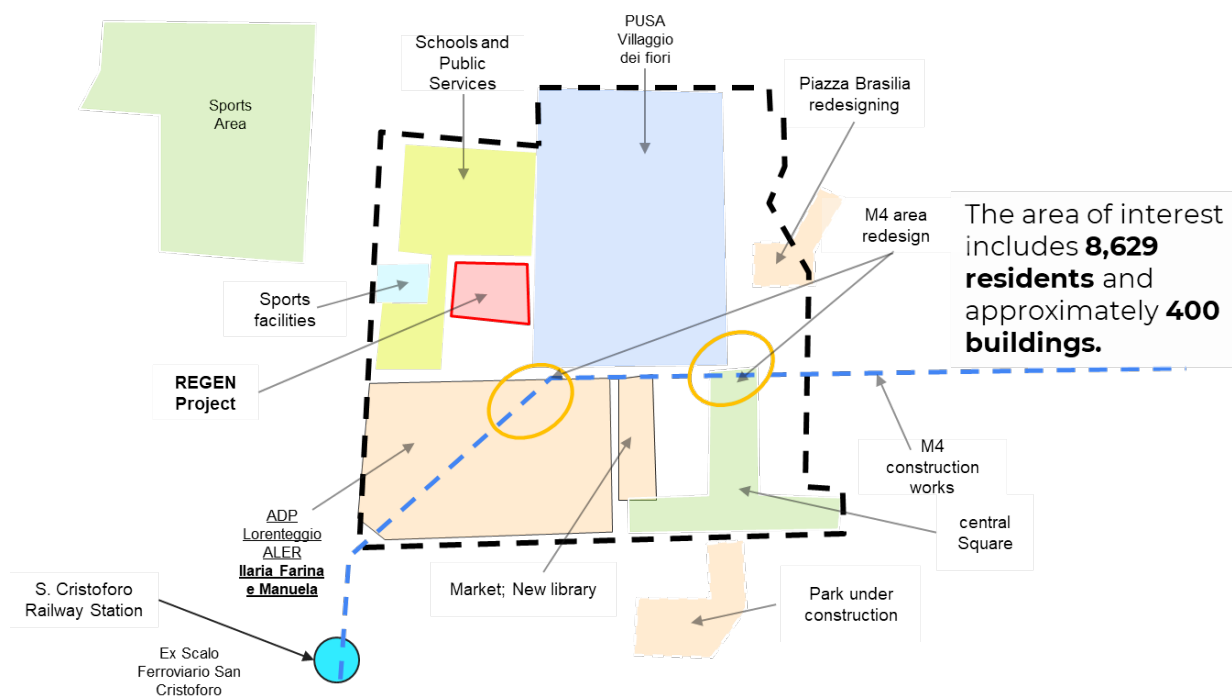


Figure 42 – Public uses present in the sector that influence it. Source: AMAT.

The concept presented above consolidates all the gathered data, offering a summary of the analyses carried out. As highlighted in the previous study, the area is set to undergo significant changes both in terms of urban mobility and architectural development. This map aims to showcase the most impactful interventions planned for the area, providing a clear vision of the anticipated transformations.

4.2.2 Socio-economic characterization

4.2.2.1 Residents' socio-economic profile

The three buildings located in Via dei Giaggioli are a significant part of the city's public housing developments and are home to a diverse population. These apartments are assigned by the Municipality of Milan through a selection process based on criteria such as annual gross income, the size of the family unit, and other specific factors. As public housing, they primarily accommodate immigrants and low-income families.

Historically, these buildings have faced socio-economic challenges, including higher unemployment rates and lower income levels compared to other areas. Since 2016, a major urban regeneration project has been underway, directly targeting these three buildings. This initiative involves the demolition and reconstruction of certain structures, the renovation of existing ones, and improvements to the surrounding public spaces. The nearby Segneri station on the newly opened M4 metro line is expected to enhance connectivity and accessibility for the residents of these buildings.

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Despite these efforts, challenges remain. Residents continue to face issues related to housing quality and access to services. Community organizations and social services play a crucial role in providing support to the inhabitants of Via dei Giaggioli.

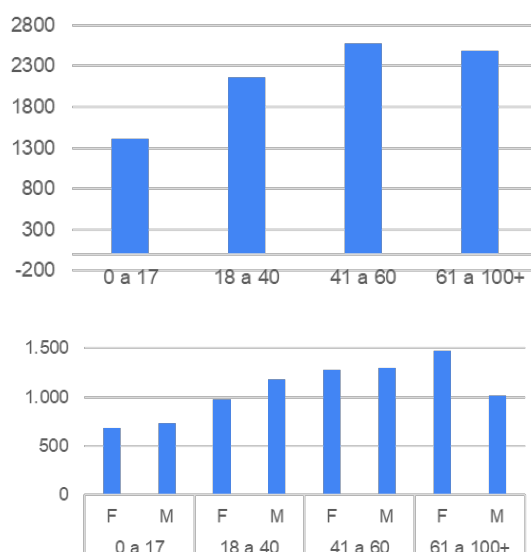


Figure 43 – Source: ISTAT.it.

The graphic indicates that the largest proportion of the resident population belongs to the 41-60 age group, followed by individuals over 60. Notably, the most represented category in the area is women over 60 years old, accounting for nearly 1,500 individuals.

Residenti:	31.588	Residents:	31588
<i>Variazione prevista al 2034:</i>	<i>34352 (+8,8%)</i>	<i>Projected change to 2034:</i>	<i>34352 (+8,8%)</i>
Densità abitativa (ab/km2):	16.073	Population density (dens/km2):	16073
<i>Densità prevista al 2034:</i>	<i>17.479</i>	<i>Projected density to 2034:</i>	<i>17479</i>
Struttura per età		Structure by age	
Bambini (0-5):	1806 (5,7%)	Children (0-5):	1806 (5,7%)
<i>Variazione prevista al 2034:</i>	<i>1943 (+7,6%)</i>	<i>Projected change to 2034:</i>	<i>1943 (+7,6%)</i>
Minorenni (0-17):	5190 (16,4%)	Minors (0-17):	5190 (16,4%)
<i>Variazione prevista al 2034:</i>	<i>5502 (+6%)</i>	<i>Projected change to 2034:</i>	<i>2289 (+6%)</i>
Giovani (18 - 34):	5643 (17,9%)	Young people (18-34):	5643 (17,9%)
<i>Variazione prevista al 2034:</i>	<i>7377 (+30,7%)</i>	<i>Projected change to 2034:</i>	<i>3002 (+30,6%)</i>
Anziani (65+):	7124 (22,6%)	Old people (65+):	7124 (22,6%)
<i>Variazione prevista al 2034:</i>	<i>7856 (+10,3%)</i>	<i>Projected change to 2034:</i>	<i>4054 (+8,4%)</i>
"Grandi" anziani (85+):	1177 (3,7%)	"Big" seniors (85+):	1177 (3,7%)
<i>Variazione prevista al 2034:</i>	<i>1297 (+10,2%)</i>	<i>Projected change to 2034:</i>	<i>1297 (+10,2%)</i>
Popolazione straniera		Foreign population	
Totale stranieri:	8035 (25,4%)	Total foreigners:	8035 (23,6%)
Minorenni tra gli stranieri:	1949 (24,3%)	Underage among foreigners:	1949 (24,3%)
Cittadinanze prevalenti (% su totale stranieri)		Prevalent citizenships (% of total foreigners)	
1° Egitto	1894 (23,6%)	1° Egypt:	1894 (23,6%)
2° Filippine	1402 (17,4%)	2° Philippines:	1402 (14,4%)
3° Sri Lanka (ex Ceylon)	699 (8,7%)	3° Sri Lanka (Ex-Ceylon)	699 (8,7%)

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Residenti:	13.679	Residents:	13679
<i>Variazione prevista al 2034:</i>	<i>14805 (+8,2%)</i>	<i>Projected change to 2034:</i>	<i>14805 (+8,2%)</i>
Densità abitativa (ab/km2):	5.191	Population density (dens/km2):	5191
<i>Densità prevista al 2034:</i>	<i>5.618</i>	<i>Projected density to 2034:</i>	<i>5618</i>
Struttura per età			
Bambini (0-5):	636 (4,6%)	Children (0-5):	636 (4,6%)
<i>Variazione prevista al 2034:</i>	<i>685 (+7,7%)</i>	<i>Projected change to 2034:</i>	<i>685 (+7,7%)</i>
Minorenni (0-17):	2159 (15,8%)	Minors (0-17):	2159 (15,8%)
<i>Variazione prevista al 2034:</i>	<i>2289 (+6%)</i>	<i>Projected change to 2034:</i>	<i>2289 (+6%)</i>
Giovani (18 - 34):	2298 (16,8%)	Young people (18-34):	2298 (16,8%)
<i>Variazione prevista al 2034:</i>	<i>3002 (+30,6%)</i>	<i>Projected change to 2034:</i>	<i>3002 (+30,6%)</i>
Anziani (65+):	3741 (27,3%)	Old people (65+):	3741 (27,3%)
<i>Variazione prevista al 2034:</i>	<i>4054 (+8,4%)</i>	<i>Projected change to 2034:</i>	<i>4054 (+8,4%)</i>
"Grandi" anziani (85+):	791 (5,8%)	"Big" seniors (85+):	791 (5,8%)
<i>Variazione prevista al 2034:</i>	<i>897 (+13,4%)</i>	<i>Projected change to 2034:</i>	<i>897 (+13,4%)</i>
Popolazione straniera			
Totale stranieri:	1965 (14,4%)	Total foreigners:	1965 (14,4%)
Minorenni tra gli stranieri:	457 (23,3%)	Underage among foreigners:	457 (23,3%)
Cittadinanze prevalenti (% su totale stranieri)		Prevalent citizenships (% of total foreigners)	
1° Egitto	439 (22,3%)	1° Egypt:	439 (22,3%)
2° Filippine	213 (10,8%)	2° Philippines:	213 (10,8%)
3° Perù	146 (7,4%)	3° Peru	146 (7,4%)

Figure 44 – Population distribution by age, country of origin of Giambellino and Lorenteggio area. Source: PGT (Plan of the Gobierno del Territorio). Italian and English version.

MILANO		SUBCOMMUNITY AREA NAME	
COD. AREA SUBCOMUNALE	DENOMINAZIONE AREA SUBCOMUNALE	AERA SUBCOMMUNITY AREA NAME	
	Studenti nelle scuole secondarie di secondo grado su domanda potenziale*	Students in secondary schools on potential demand	0,0
	Studenti nelle scuole primarie e secondarie di primo grado su domanda potenziale*	Students in primary and secondary schools on potential demand	59,7
	Offerta di servizi socio-educativi per l'infanzia su domanda potenziale*	Supply of socio-educational services for children on potential demand	10,0
	Offerta asili nido e altri servizi socio-educativi per la prima infanzia su domanda potenziale*	Supply of kindergartens and other early childhood socio-educational services on potential demand	34,8
	Ospedali con pronto soccorso	Hospitals with emergency rooms	1,7
	Indice degli addetti ad attività creative e culturali sulla popolazione servita	Index of those employed in creative and cultural activities over the population served	0,9
	Indice di centralità	Index of centrality	2.337,7
	Stima del valore medio immobiliare (€/m²)	Estimated average property value (€/m2)	105,1
	Indicatore di vulnerabilità sociale e materiale	Social and material vulnerability indicator	0,2
	Tasso di alloggi impropri	Improper housing rate	1,4
	Incidenza delle famiglie con potenziale disagio economico	Incidence of households with potential economic hardship	10,2
	Incidenza di giovani fuori dal mercato del lavoro e dalla formazione	Incidence of young people out of the labor market and training	8,2
	Tasso di disoccupazione	Unemployment rate	49,8
	Tasso di occupazione	Employment rate	67,7
	Indice di adulti con diploma o laurea	Index of adults with a diploma or degree	4,2
	Indice di non completamento del ciclo di scuola secondaria di primo	Secondary school non-completion index	20,8
	Incidenza di giovani fino a 24anni	Incidence of young people up to 24 years old	189,7
	Incidenza di residenti stranieri	Incidence of foreign residents	189,9
	Indice di vecchiaia	Old age index	6,1
	Indice di conservazione degli edifici ad uso residenziale	Conservation index of buildings for residential use	3,0
	Indice di espansione edilizia	Building expansion index	14.578,8
	Densità abitativa (Ab/ Km²)	Population density (Ab/ Km2)	5.445
	Stranieri residenti	Foreign residents	3.716
	Popolazione 0-14 anni residente	Population 0-14 years old resident	3.716
	Popolazione residente	Resident population	28.703
	Superficie dell'area (Km²)	Surface area (km2)	2,0
	Numero di sezioni di censimento	Number of census sections	97
			49
			53

Figure 45 – Statistical data on the population of Giambellino-Lorenteggio.
Source: ISTAT.

D3.1 - Diagnosis and Baseline for all the demo sites

4.2.2.2 Citizen and stakeholders' engagement

The revitalization and transformation of Giambellino-Lorenteggio require an inclusive, collaborative approach involving political, technical, cultural, and community stakeholders.

► Stakeholder Mapping

To ensure effective participation, stakeholders in Giambellino-Lorenteggio have been mapped based on their roles and influence:

Table 10 – Stakeholders in Giambellino-Lorenteggio per roles and influence.

Local Group and Organization Type	Examples in Giambellino-Lorenteggio
Local Residents and Committees	Resident associations, such as "Laboratorio di Quartiere Giambellino-Lorenteggio".
Youth and Outreach Groups	Youth Community Center, such as CAG CD Giambellino and Punto Luce SaveTheChildren. Sporting club such as A.S.D. Sporting Murialdo
Cultural Organizations	Art collectives and hubs like CAM Legioni Romane, specialized in laboratory and cultural activities.
Municipal Authorities	CDM departments for green and environment, urban planning, mobility, house, and social services. Municipio 6
Vulnerable Populations	Migrant communities and advocacy groups

This mapping builds on lessons from previous projects and aims to refine engagement with subgroups that represent the diverse fabric of the neighbourhood.

► Stakeholder Engagement

Approaches for Engagement

- *Workshops for Key Stakeholders:* Structured workshops with community leaders, local authorities, and organizations to co-develop a shared vision and identify priorities for REGEN interventions.
- *Public Consultation Events:* Open forums and neighbourhood assemblies to include a wider spectrum of voices and ensure inclusivity.

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- *Thematic Working Groups:* Focusing on topics such as housing, green spaces, youth engagement, and cultural heritage.

Lessons from Previous Initiatives

Building on the experience of past initiatives such as the Permanent Citizens' Climate Assembly, a civic participation body established to give citizens a voice on activities concerning climate change, air quality and the ecological transition, and the School of Neighbourhoods, inspired by the tradition of Milan's civic schools, which promotes citizen protagonism and encourages them to take an active part in the life of the city, REGEN will help promote carbon neutral lifestyles and community integration.

Cultural Stakeholders and Initiatives

The neighbourhood boasts a vibrant cultural landscape with key organizations and initiatives that have shaped its identity:

Key Cultural Stakeholders

- Laboratorio di Quartiere Giambellino-Lorenteggio: A vital hub for cultural programs, exhibitions, and workshops.
- Local artists and grassroots collectives advocating for creative.

Cultural Initiatives

- Public Art Projects: Murals and installations reflecting the area's diverse stories.
- Open-Air Cinema: During the summer, the neighbourhood comes alive with outdoor cinema events open to the public, featuring programming tailored to different age groups.
- Cultural activities and workshops: Mercato Lorenteggio and Casetta verde host activities promoted by local organizations.

Community Vision and Priorities

Giambellino-Lorenteggio as an inclusive and vibrant neighbourhood, where accessible public spaces foster community bonds, affordable housing supports diverse needs, and innovative green solutions lead the way in sustainability. The Key Community Priorities are:

- Public Housing Renewal: Addressing accessibility and energy efficiency challenges.
- Green Spaces and Mobility: Enhancing parks, pedestrian areas, and cycling routes.
- Social Inclusion: Programs fostering cohesion among diverse populations.

5 Dublin demo site

Dublin, Ireland's capital, and largest city, is structured into several distinct areas, including the historic city centre, the lively modern districts, and the coastal suburbs. It is Ireland's administrative, commercial, and trading hub, as well as its main centre of education and culture.

The demo intervention area is the Ringsend and Irishtown residential neighbourhood along with the Poolbeg peninsula which is mainly an industrial area. The total land area of the demo site is 2.26 km² and is situated approximately 3 km from Dublin City Centre.

5.1 Territorial characterization

Dublin geographic county is in the province of Leinster, eastern Ireland. It separates into four jurisdictions, each with its respective local authority. Fingal is to the north, South Dublin is to the southwest, and Dún Laoghaire–Rathdown to the southeast. The city of Dublin itself is its own jurisdiction. Dublin has the administrative level of both a city and a county.

The Greater Dublin Area (GDA) includes the geographical area of the four Dublin local authorities, Kildare, Meath, and Wicklow. It incorporates the regions of both the Dublin Regional Authority and the Mid-East Regional Authority.

5.1.1 Physical characterization

► Natural & geographical characteristics

Dublin is on the coast of the Irish Sea, at the head of a large bay sheltered by the Wicklow Mountains to the south. The city is generally flat, bisected by the River Liffey. The Liffey flows from the Wicklow Mountains through the city into Dublin Bay. O'Connell Bridge serves as the main connection between the north and south of the city. Dublin experiences a maritime temperate climate with average temperatures. These temperatures range from 6°C in January–February to 20°C in July–August. The city receives the most sunshine in May and June, averaging four hours a day. Monthly rainfall varies between 50–100mm, with fewer than 10 days of annual snow.

Human activity asserts a strong influence on Dublin's urban ecosystem. This has led to a fragmented landscape where some species have not survived due to habitat loss. There are still some areas of high natural value within the city. The public owns many of these, and they serve to preserve the historic landscape. These natural areas act as reservoirs of genetic biodiversity, maintaining wildlife populations. Dublin boasts over 200 public parks. They provide recreational, cultural, environmental, and social benefits. The largest of these is Phoenix Park, located 2–4 kilometres west of the city centre. It

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encompasses 707 hectares of grassland and tree-lined avenues. The park has been home to herds of wild fallow deer since the 17th century.

► Infrastructures and services (ICT, public equipment, etc.)

Dublin is the region's primary seaport. Nearby (around 7km north) is Dublin Airport, an international airport. By total passenger traffic, it is the busiest of Ireland's airports.

The M50 motorway is a C-shaped orbital motorway in Dublin. It was built as a complete bypass of Dublin City. It is also the busiest motorway in Ireland. Due to urban expansion and sprawl, it now runs through Dublin's suburbs. The M50 serves as a route within Dublin, connecting the suburbs.

There are three main stations in Central Dublin. There, you can catch long-distance and intercity trains.

There are three types of commuter rail services in Dublin available:

- DART trains run frequently along Dublin Bay. They serve Central Dublin and the suburbs along the coast.
- Commuter trains serve the suburbs to the north, west, and south of the city. They are usually frequent at rush hour but less so during off-peak times.
- Luas trams (2 lines), a light rail service, serves many areas of Central Dublin and residential areas, most of which are not too far from the centre.

Bus services provide the rest of the public transport, operated by Dublin Bus.

► Building stock and retrofitting needs

Apart from the port area and the docks, Dublin is a low-built, steeped city, with few buildings dating from before the 17th century. The Roman Catholic churches are 19th—and 20th-century structures. The 17-story Liberty Hall was built in 1961–65 as a trade union headquarters. Dublin's tallest building joins a spate of new high-rise offices and apartments. Still, most buildings are no higher than 5 or 6 stories.

Dublin Castle displays three elements of architectural legacy (Norse, Norman, and Georgian). The castle, constructed in the early thirteenth century on the site of a Viking settlement, sits in the city's centre. For centuries, it served as the headquarters of the English and later British administration in Ireland. In 1922, following Ireland's independence, Dublin Castle was handed over to the new Irish government. It is now a major government complex and a key tourist attraction.

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► Energy supply and consuming patterns

The 2016 census captured data on residential heating fuel sources, including natural gas, electricity, oil, coal, peat, LPG, and wood. Natural gas was the predominant heating source in the Dublin Region, accounting for 68% of all households. Electricity was 14%, and oil was 11%. The rest only accounts for 7% of residential heating sources.

The residential building stock in the Dublin Region primarily consists of terraced and semi-detached dwellings, each constituting 36%, with apartments at 22%. Detached houses are the rarest in Dublin, comprising only 6% of the total residential building stock. This stock is both ageing and poorly rated, with 78% built before 2000, which is higher than the national average of 71% built before the same year.

Aging of the housing stock affects the energy efficiency of the dwellings.

► Mobility & accessibility

As of December 2020, there were 554,470 private cars licensed in Dublin. This represents over 25% of the total number of cars licensed in the country. The number of cars licensed in Dublin has grown over the past number of decades. Between the years 2006 and 2020, the number of cars in Dublin increased by 18%, or over 83,000 vehicles. Of those vehicles licensed in Dublin in 2020, 5,257 were battery electric vehicles (BEVs), representing under 1% of the vehicle stock. Roads such as the M50 ring road and the radial national roads and motorways into the city, have been identified with the highest traffic volumes. Thus, the highest CO2 emissions.

The Bike Life Report, published in 2019, estimated that 70.5 million cycle trips took place annually in the Dublin Metropolitan Area. This summed up a total distance travelled of 375 million km. Equal to the distance travelled by approximately 28,000 cars in a year. This report also found that safety is the single largest barrier to having more people cycling in Dublin. The existing cycle network in Dublin is of poor quality. Little segregation or protection from vehicular traffic is provided. Minimal consideration at junctions.

5.1.2 Socio-economic characterization

Dublin is an international city and a gateway to the European Union for many businesses. This contributes to Ireland's economy and is a major economic driver for the country. The city is attractive for work and investment. It hosts influential multinational corporations, particularly in technology and finance. Dublin is an important IT hub. 9 out of the top 10 global tech companies are located there, and it also has a thriving start-up scene. The economy is services-based, accounting for 82% of total activity.

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Manufacturing and construction make up 19%. As the capital, Dublin plays a significant economic, administrative, and cultural role.

► Population and Demographics

The population of Dublin City has steadily increased over the last quarter-century, growing by 75,321 persons (14%) from 479,233 in 1991 to 592,713 in 2022. The entire county's population was 1,458,154 in 2022. The city is diverse, with 17% of the usually resident population being non-Irish in 2022. The average age of Dublin's population was 38 years in April 2022, up from 36.8 years in 2016. The number of people aged 65 and over increased by 19% to 195,664 in Dublin, and by 22% to 776,315 nationally since 2016.

► Employment and Housing

In April 2022, nearly 1.19 million people in Dublin were aged 15 and over, with more than 698,900 people at work. This included over 300,200 people working in Dublin City, 106,500 in Dún Laoghaire-Rathdown, 155,100 in Fingal, and 137,100 in South Dublin, marking a 14% increase from 2016. Nationally, 2.3 million people were at work in April 2022, up by 16%. Nearly 62,400 people were unemployed in Dublin, and over 171,700 were retired, an 18% increase since 2016. In 2022, 58% of households in Dublin owned their homes, while 36% rented, compared to 66% homeownership and 28% renting nationally.

► Spatial Planning and Development

Spatial planning in Ireland operates at different levels. The National Planning Framework is the overarching policy. It highlights social, economic, and cultural development. Dublin participates in the Eastern and Midland Regional Assembly (EMRA). This is one of three regional assemblies in Ireland. They operate independently to provide various functions for the region. The Regional Spatial and Economic Strategy (RSES) identifies regional assets, opportunities, and pressures, providing policy responses. This is done through Regional Policy Objectives. Each of the four local authorities in Dublin County has its own County or City Development Plan. Engagement from citizens and agencies is crucial for achieving the plan's targets.

Irish Planning System An Overview



Figure 46 - Irish Planning System

5.2 Intervention area

The Dublin REGEN Demosite is the same area as the Decarbonisation Zone identified in the 2024 – 2029 Dublin City Council Climate Action Plan (*Dublin City Council Climate Action Plan 2024 - 2029 | Dublin City Council, 2024*). The area contains the Ringsend and Irishtown urban communities as well as the Poolbeg peninsula. For the rest of this document the area will be referred interchangeably as Ringsend and Poolbeg Decarbonizing Zone (DZ) or Dublin REGEN Demo site/Pilot site.

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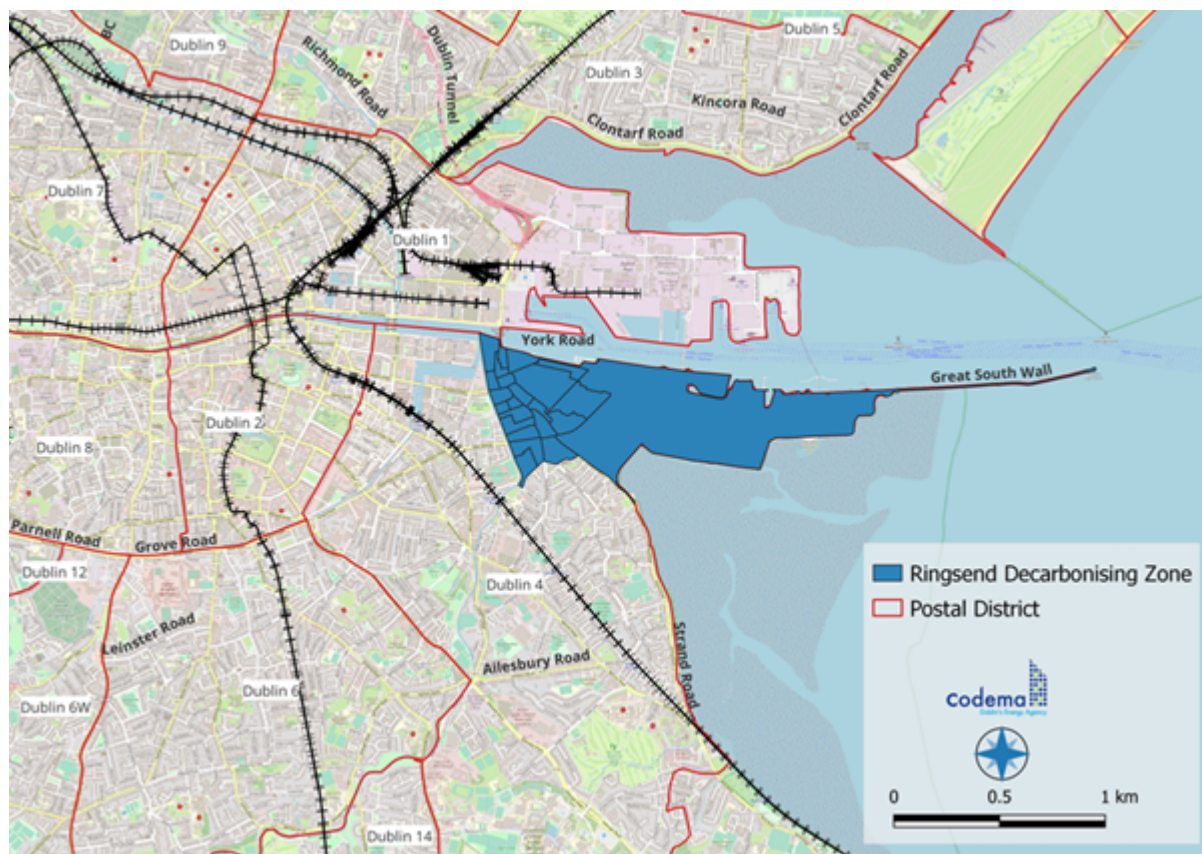


Figure 47 – Location and Boundary of the Ringsend and Poolbeg DZ

5.2.1 Physical characterization

5.2.1.1 Building stock

► Residential profile

The following series of maps (residential emissions, building energy rating and heating system) give an idea of the situation of the residential housing stock in the Ringsend and Poolbeg DZ (Dublin demo site). It gives a snapshot of the areas where home energy upgrades or retrofits can have the greatest impact on emissions and air quality, as well as the type of work that will be required. There are 2,408 residential households in the area. Figure 48 shows the spatial breakdown of residential emissions in the Ringsend and Poolbeg DZ (Dublin Demo site) per small area³, highlighting the areas of highest and lowest emissions from the residential sector. The darker colours on the map help show the areas where home energy upgrades (insulation, renewables installation, etc) can have the greatest impact on reducing emissions. These areas could be particularly relevant for testing the Assessment Framework for Urban Regeneration (AFUR) and more generally to engage with the population.

³ A 'Small Area' is the smallest geographical breakdown used in Ireland for statistical purposes. Each small area includes between 80-120 buildings.

D3.1 - Diagnosis and Baseline for all the demo sites

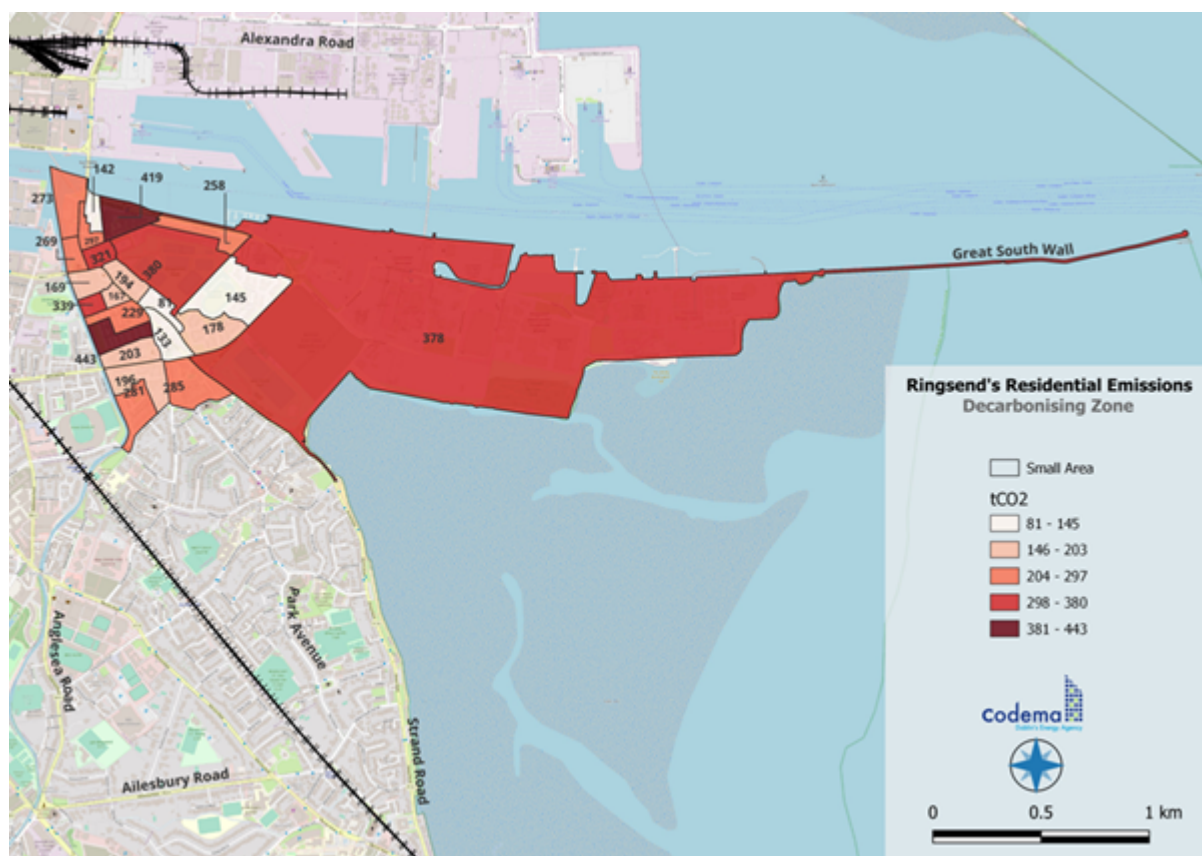


Figure 48 – Residential Emissions (tCO₂) per Small Area in the Ringsend and Poolbeg DZ (DREM data, 2021)

A Building Energy Rating (BER) certificate rates a home's energy performance on a scale between A and G. A-rated homes are the most energy efficient while G-rated homes are the least energy efficient. Figure 49 shows the BERs in the DZ, as published by SEAI (*BER Map of Ireland*, n.d.). The BER database shows that there are a total of 999 rated residential properties in the area, most of which are rated in the middle to lower ranges, with the majority rated C3. 65% of the DZ residential BERs are rated C3 or worse, reflecting the ageing building stock in this area and highlighting the work required to meet the national aims of improving the BER of our building stock.

D3.1 - Diagnosis and Baseline for all the demo sites

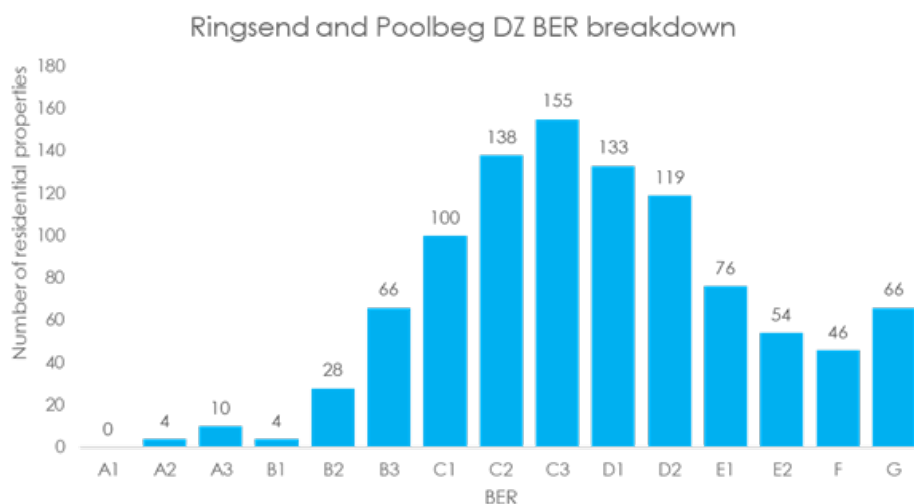


Figure 49 – Number of residential BERs in the Ringsend and Poolbeg DZ (SEAI 2023)

Figure 50 shows the area where the primary heating energy sources (gas, oil, or electricity) are used by permanent private households in the decarbonising zone. Natural gas is the main fuel source for central heating (58.2%), followed by electricity (31.4%) and oil (1.4%). Other fuels include coal, wood, peat, and Liquefied Petroleum Gas (LPG).

Table 11 – Proportion of Heating Energy Sources (CSO, Census 2016)

	Electricity	Natural gas	Oil	Other
Heating energy sources	31.4%	58.2%	1.4%	9%

D3.1 - Diagnosis and Baseline for all the demo sites

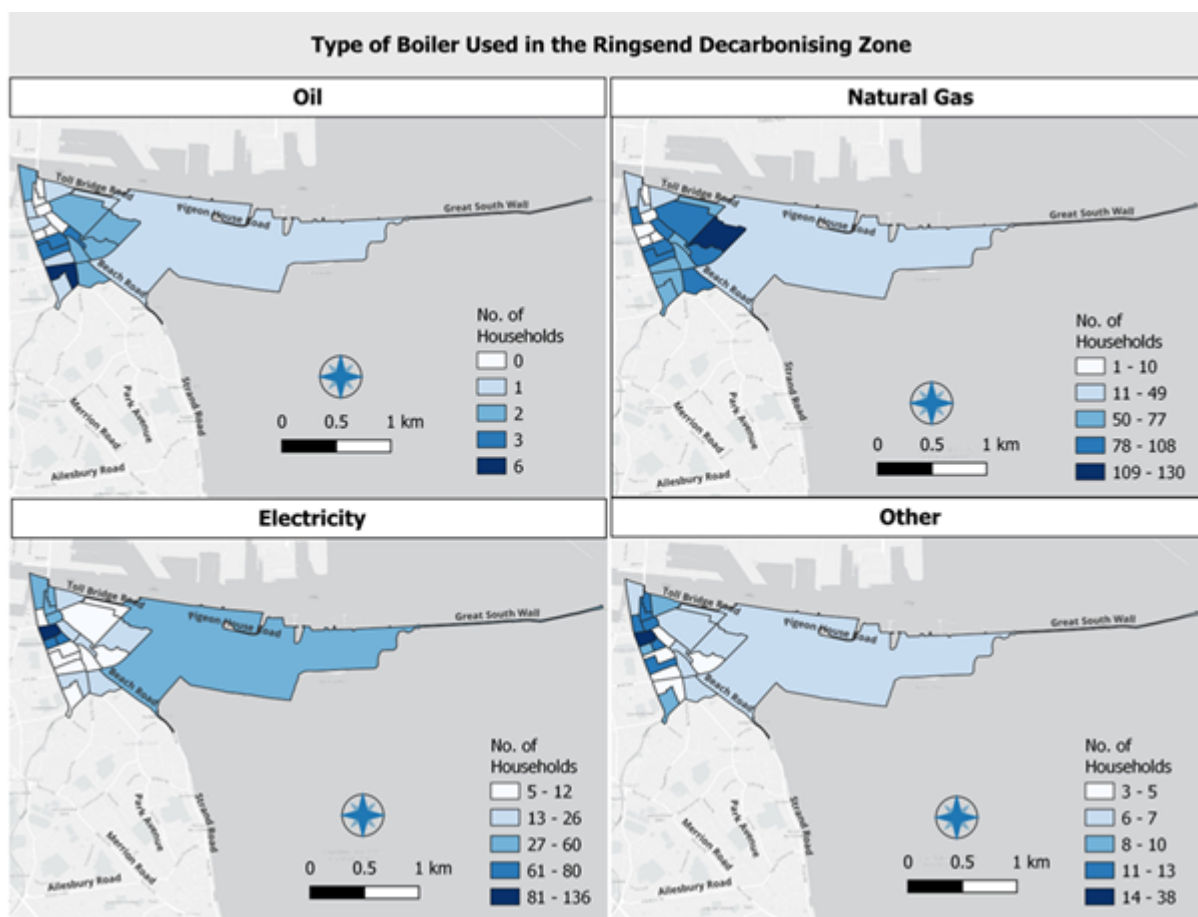


Figure 50 – Central Heating Energy Source used by Households per Small Area in the Ringsend and Poolbeg DZ (CSO, 2016 Census data)

► Commercial Profile

The GHG emissions from the wider commercial sector within the Ringsend and Poolbeg DZ are reflected in Figure 51 on the next page. This includes small, medium and large businesses, ranging from retail shops and supermarkets to office buildings and some industrial activities. It also includes public sector buildings (some municipal buildings and additionally other public sector) (API, n.d.). The location of areas that emit the most and least emissions from this sector helps us to understand where future emission reductions and renewable energy projects can have the greatest impact.

The small area that covers the Poolbeg peninsula is by far the largest emitter of the DZ; the actual commercial and industrial emissions of that small area would be significantly higher if all the infrastructures that would need bespoke analysis were accounted for. Many of them have their own targets and regulations that are set at national level.

D3.1 - Diagnosis and Baseline for all the demo sites

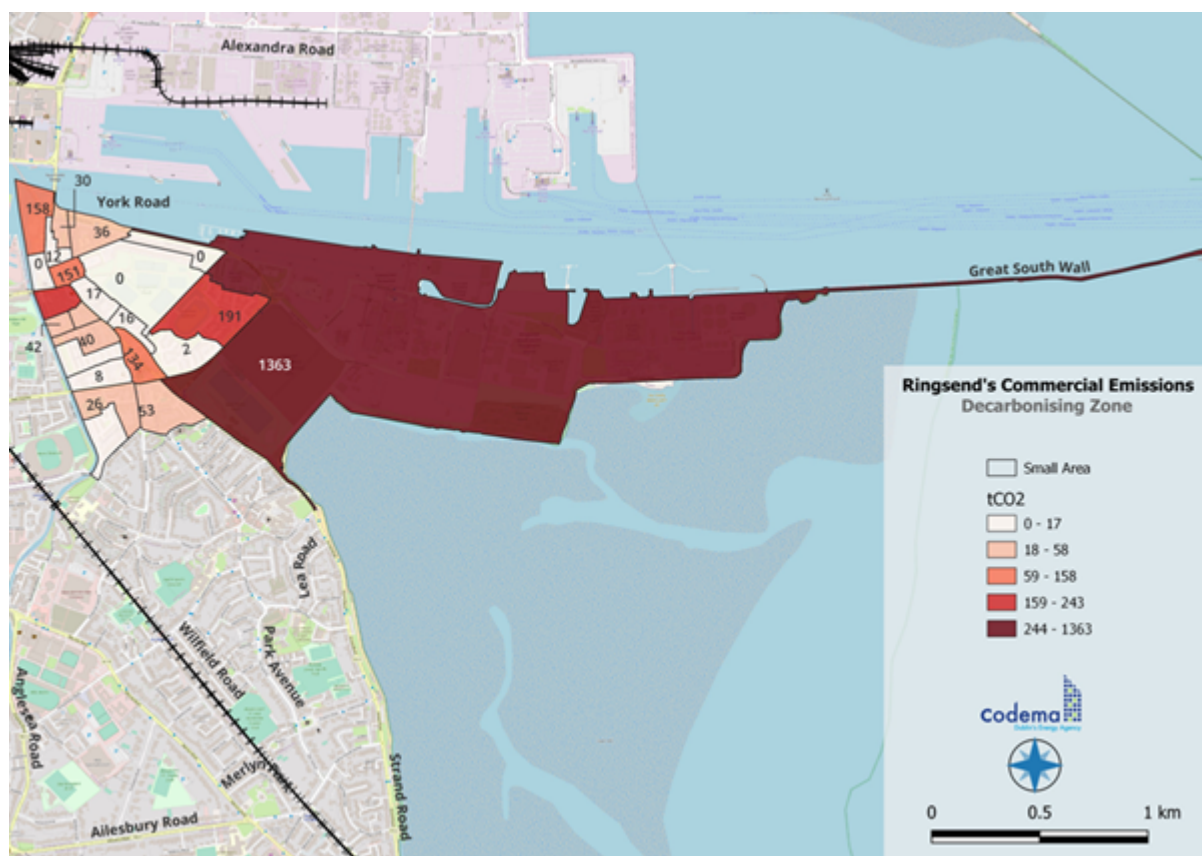


Figure 51 – Commercial Emissions (tCO₂) per Small Area in the Ringsend and Poolbeg DZ (DREM data, 2021)

5.2.1.2 Public space and urban accessibility

► Public space characterization

The land use zoning of the area can be seen in Figure 52 further in this section. The area within the Demo site that is zoned for residential purposes is made up of Sustainable Residential Neighbourhoods (12%) and Conservation Areas Residential Neighbourhoods (4.2%). Areas that are dedicated to the protection and provisions for institutional and community uses, including waterways protection and community and institutional resource lands, cover 2% of the zone. Mixed-service facilities, which include neighbourhood centres, district centres, and strategic development and regeneration areas, comprise 19.3% of the area. Open spaces, which include parks, greenery and the green network, account for 25.3% of the Pilot area. Enterprise and employment-related areas, designated for industry, represent a substantial 37.1% of the zone and are the biggest parts of the Demo site (*Dublin City Council Climate Action Plan 2024 - 2029 | Dublin City Council, 2024*).

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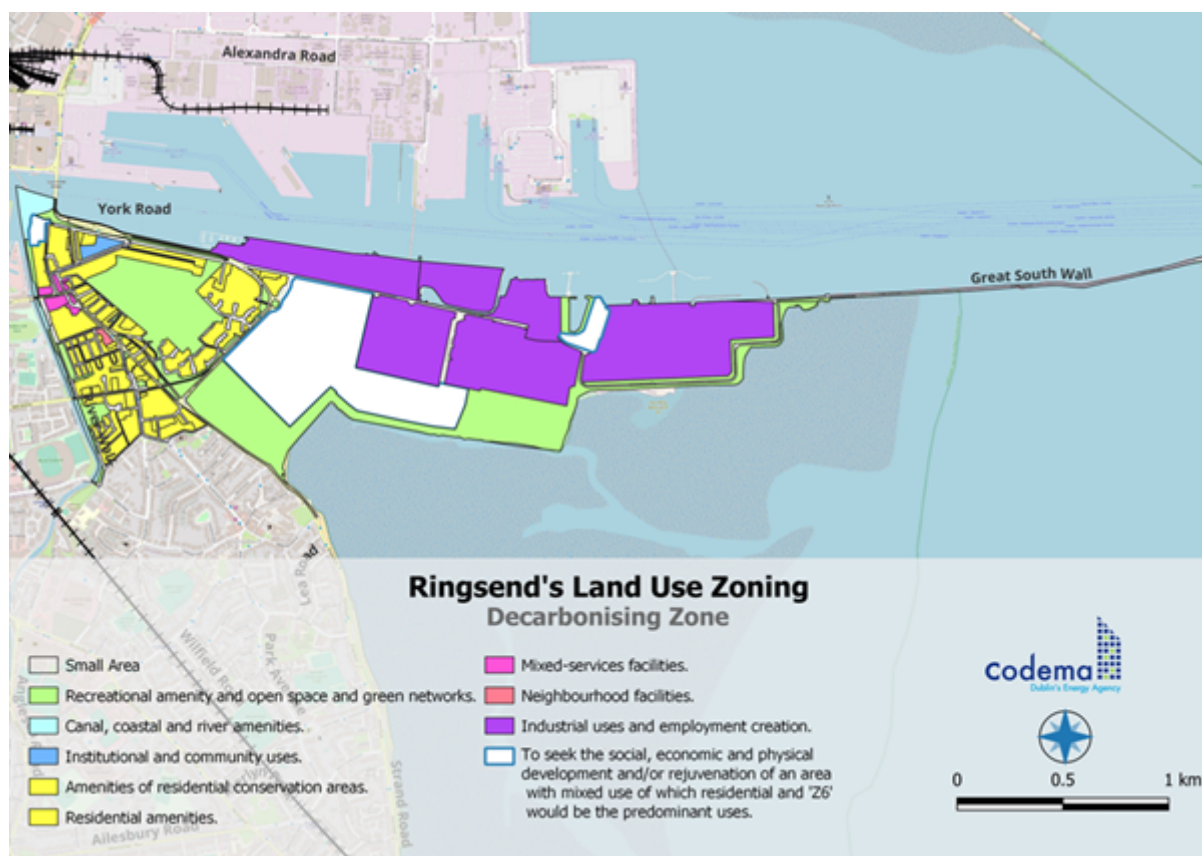


Figure 52 – Land Zoning of the Ringsend and Poolbeg DZ (DCC, Dublin City Development Plan 2022-2028)

Table 12 – Land Use Zoning: Zone Reference from the Dublin City Development Plan 2022-2028

Zone	Title	Ringsend and Poolbeg DZ Area Coverage (%)
Z1	Sustainable Residential Neighbourhoods	12%
Z2	Residential Neighbourhoods (Conservation Areas)	4.2%
Z3	Neighbourhood Centres	0.1%
Z4	District Centres	0.6%
Z7	Employment (Industry)	37.1%
Z9	Amenity/Open Space Lands/Green Network	25.3%
Z11	Waterways Protection	1.6%
Z14	Strategic Development and Regeneration Areas	18.6%
Z15	Community and Institutional Resource Lands (Education, Recreation, Community, Green Infrastructure and Health)	0.4%

► Mobility characterization

There is no station directly linked to the national railway network within the Demo site. The closest stations are the Luas Red line terminus station (The Point) on the other side of the River Liffey, across Tom Clarke Bridge (around 650m away from the bridge), and the Lansdowne Road train station (Dart and other train services) next to the Aviva Stadium (approximately 450m away from New Bridge, Lansdowne).

In terms of road networks, the area is served primarily by three roads:

- R131, which crosses the River Liffey at Tom Clarke Bridge (commonly known as the East-Link Toll Bridge) before entering the Demo site.
- R802, which crosses the River Dodder at Ringsend Bridge.
- R111, which crosses the River Dodder at London Bridge.

Finally, the area is served by the C1, C2 and 47 bus routes and the 84n Nitelink.

► Transport Profile and emissions

In the Ringsend and Poolbeg Decarbonising Zone, all transport emissions considered come from road trips due to the absence of any rail. Maritime transport emissions from ships located in the harbor are not considered in this baseline.

Figure 53 shows emissions associated with the roads in the DZ area and Figure 54 shows how people within the DZ travel to work, school, or college.

From Figure 53, it appears that the bulk of the transport emissions are located on the main roads crossing the DZ and giving access to the Poolbeg peninsula, rather than in the residential areas. This can be explained by the truck activity delivering to and from the several industrial buildings located within the Poolbeg industrial area. A typical example would be the delivery of waste to the Waste-to-Energy Facility. These types of transport emissions are difficult to tackle, as this activity is crucial for the entire Dublin region.

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Figure 53 – Road Emissions (tCO₂) – based on Modelling Data supplied by the National Transport Authority (NTA, 2016)

The chart in Figure 54 shows how the people living in the DZ area are travelling to school, college or work, over half (51.1%) of these commuters use a sustainable mode of travel (on foot or cycling) and 13.7% use public transport. However, around a quarter of commuters still travel by private vehicles, which produces greater emissions per person. This information can be used to support new plans for more sustainable travel options within the zone.

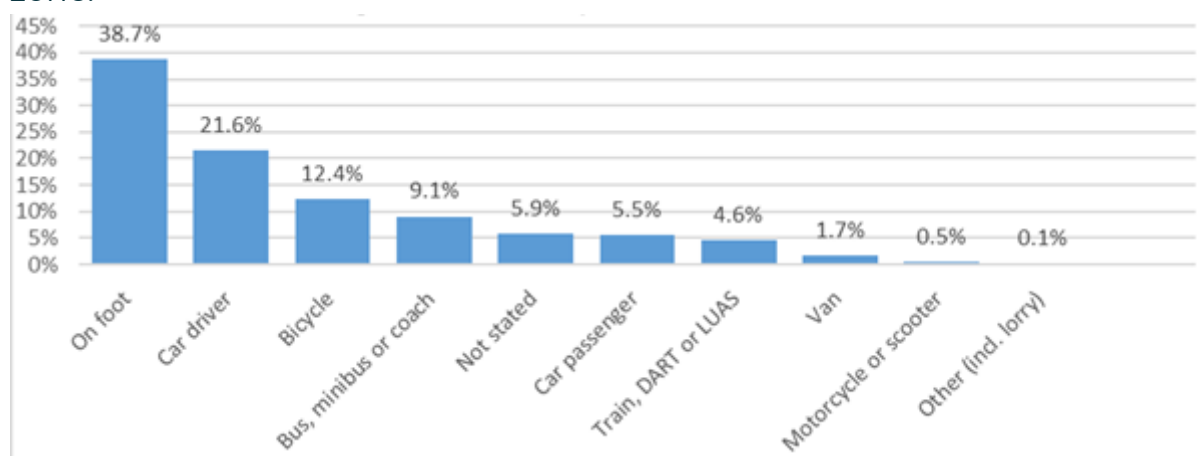


Figure 54 – Journeys to work, school, or college within the Ringsend and Poolbeg DZ (CSO, 2016)

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5.2.1.3 Infrastructures and services (ICT, public equipment, etc.)

► Public Infrastructure

The Figure below shows some of the main public buildings and other important infrastructures of the area.

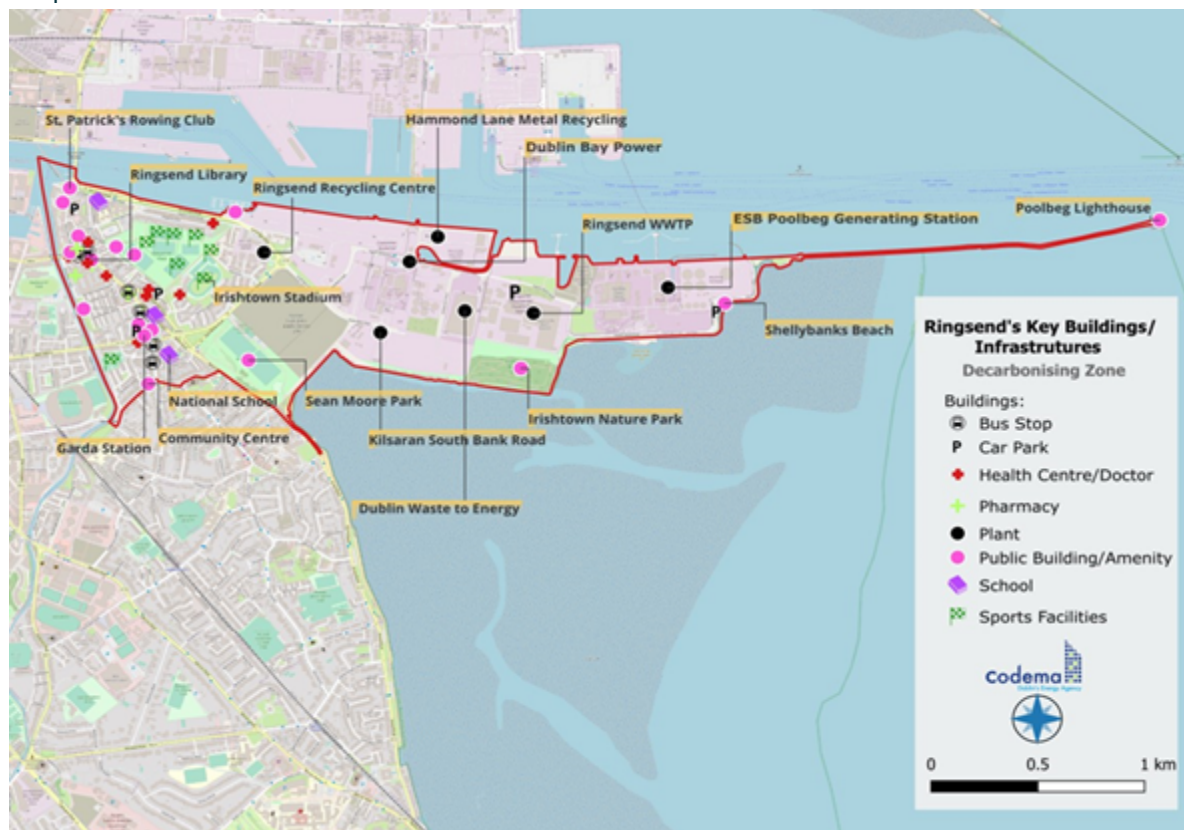


Figure 55 – Main Amenities and Public Places in the Ringsend and Poolbeg DZ (Dublin Demosite)

The Ringsend and Poolbeg DZ has several energy generation plants or other critical infrastructure within its boundary. These infrastructures produce high GHG emissions, but they are of high importance as they supply the area with electricity or provide key services to the Dublin region. As such, it is difficult to influence and reduce their GHG emissions with local measures and each of them should be treated on a case-by-case basis. These infrastructures usually have their own GHG emissions reduction targets (such as the EU Emissions Trading System⁴) or specific regulations, as is the case for the Ringsend Wastewater Treatment plant for example.

The most significant ones are:

- ESB Poolbeg Generating Station
- Dublin Bay Power Plant

⁴ The EU Emissions Trading System is a “cap and trade” scheme where a limit (the cap) is placed on the right to emit specified pollutants over a geographic area and companies can trade emission rights within that area.

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- Poolbeg and Ringsend Flexgen power plant
- Dublin Waste-to-Energy Facility (Poolbeg Incinerator)
- Ringsend Wastewater Treatment Plant
- Poolbeg side (South of Liffey estuary) of Dublin Port

Dublin Port currently develops a project focuses on the Dublin Port company-owned lands of the south port area on the Poolbeg Peninsula (*3FM Project | Bringing Dublin Port to 2040 | Dublin Port, n.d.*). The project notably plans a new public road, and bridge called the Southern Port Access Route (SPAR) to link the North and South Port Estates.

5.2.2 Socio-economic characterization

Ringsend is an area steeped in history with a strong sense of community. A vast range of organisations have been founded over the years to address rising concerns and societal problems within the area.

5.2.2.1 Residents' socio-economic profile

The population of the Dublin demo site was nearly 5,800 as of 2022. Young people (i.e. younger than 20) make up 19.1% of the total population. 17.5% of the population is aged 60 and over and the remaining 63.4% are aged between 20 and 60.

Among the population over 15 years old within the REGEN Pilot in 2022, around 65% were working, around 8% were studying and around 12% were retired. The unemployment rate was 5.6%, which is similar to the national level. The remaining of the population indicated that they are neither working nor looking for a job due to different reasons. It could be for example to take care of the family or because of a disability or permanent sickness. On average people would have a yearly income between 30 000 and 60 000 euros. The median income is 46 000 euros (*Census 2022 Small Area Population Statistics - CSO - Central Statistics Office, n.d.*).

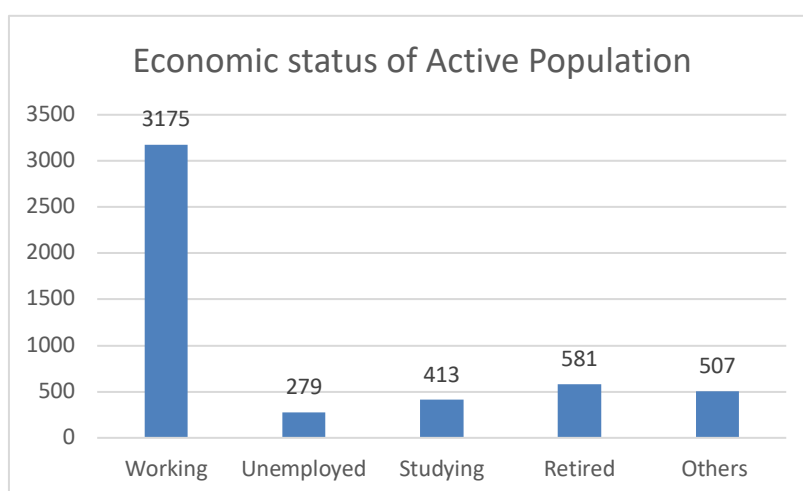


Figure 56 – Main economic status of active population in Dublin REGEN boundaries (CSO, 2022)

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Around 47% of dwellings are rented in the area and 42% are occupied by the owners. 6.5% of the total dwellings in the area are identified as vacant. The share of dwellings rented specifically for social housing is around 20%.

48% of the population is male and 52% is female. In terms of citizenship around 82% were Irish, 1.5 from the UK, 8% from the EU and 8% from the rest of the world (Census 2022 Small Area Population Statistics - CSO - Central Statistics Office, n.d.).

5.2.2.2 Citizen and stakeholders' engagement

► Stakeholder Mapping

A comprehensive understanding of the local stakeholders in the Dublin Demo site (the Ringsend and Poolbeg DZ) serves as a foundation to foster collaboration for future actions. Codema carried out stakeholder mapping and engagement on behalf of DCC during their previous work on the Ringsend and Poolbeg DZ from March 2023 to February 2024. This process involved desk-based research and active engagement with local community groups, community leaders, businesses, and industrial organisations. To identify different community groups, they were grouped into ten categories. Mapping carried out over REGEN will clarify the social structure of these groups and may further define potential subgroups. The initial categorization used can be seen in the table below:

Table 13 – Pilot site Local Group and Organisation Type (Source: Codema)

Local Group and Organisation Type	
School / Educational Facilities	Childcare Provider / Youth Outreach
Health Centres	Business
Sports & Recreation	Public Spaces / Community Group
Minority / Targeted Support Groups	Multi-Purpose Amenity
Old Age Support Groups	Local Authority

► Stakeholder Engagement

During the DZ engagement process, community leaders were identified and invited to participate in facilitated workshops to share their insights and knowledge of the community. These community leaders formed what would come to be known as the Ringsend and Poolbeg DZ Team. Unfortunately, attendance at workshops and interest from much of the DZ Team was low. This could indicate a lack of interest or availability to participate in climate conversations amongst those who are most influential in the community. Two events that were held for the wider community towards the end of the process proved to be better attended. These learning

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from the DZ engagement process will be considered while engaging the community in REGEN's engagement activities.

► Community Vision and Objectives

The vision statement below was developed through a series of facilitated exercises held during the DZ team workshops and at wider, community-based events. A vision statement is meant to be realistic and should inspire the community. As part of the visioning process, participants were asked to complete a postcard from the year 2050, imagining a fossil fuel free community. The postcard entries and further discussion were then analyzed to identify key themes such as inclusivity, safety, affordability, and connectivity. These themes informed the draft vision statement below:

In 2050, Ringsend is a vibrant, inclusive, and affordable village with clean air and waterways and safe streets for travel, play and for connecting with each other. Ringsend is celebrated and protected as the Jewel of the River Liffey and is leading the way in local climate action.

In addition to creating a vision statement, members of the community were invited to the final wider community event to determine prioritized community climate actions. Actions which were prioritized by the community will help to inform discussions during the Living Labs engagement process.

6 Baseline performances of demo sites

To identify the improvement potential of the four demo sites, an analysis of their baseline performances based on common indicators (key performance indicators – KPI) is provided in this section. A set of KPIs was defined to describe the performances in the different domains of urban regeneration (see section 1), based on a review of building/neighbourhood certification schemes and of available data from demo sites.

6.1 Built environment / Energy system performances.

Table 14 – Built environment/energy systems KPI baseline table.

Indicator	Unit	Beckerich		Dublin		Milan		Laredo	
Distribution of building energy class	% of measured values (% relative to overall buildings)	A	83 (3,3)	A	1,4 (0,6)	A	7,6 (2,0)	A	0
		B	12 (0,5)	B	9,8 (3,9)	B	3,4 (0,9)	B	0
		C	5 (0,2)	C	39,3 (16)	C	5,7 (1,5)	C	0
		D	0 (0,0)	D	25,2 (10)	D	11 (2,9)	D	0,9
		E	0 (0,0)	E	13 (5,2)	E	19 (4,9)	E	23
		F	0 (0,0)	F	4,6 (1,8)	F	23 (6, 1)	F	7,1
		G	0 (0,0)	G	6,6 (2,6)	G	30 (7,9)	G	69
		No data: 96%		No data: 60%		No data: 74%		No data: 0%	
Average annual energy consumption of site buildings	kWh/m ² /year	99,3		269,0		185,4		234,5	
Distribution of building CO2:	% of measured values (% relative to overall buildings)	A	83 (3,3)	A	1,5 (0,6)	NA		A	0
		B	12 (0,5)	B	10 (3,9)			B	0
		C	5 (0,2)	C	39 (16)			C	0
		D	0 (0,0)	D	25 (10)			D	4,7
		E	0 (0,0)	E	13 (5,2)			E	72,5

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Indicator	Unit	Beckerich		Dublin		Milan	Laredo	
		F	0 (0,0)	F	4,5 (1,8)		F	22,7
		G	0 (0,0)	G	6,5 (2,6)		G	0
Average annual GHG emissions from energy use of site buildings	kg CO ₂ eq /m ² /year	12		57		NA	41	
Average ratio of energy costs over residents' income	%	3,8		8,0		10,0	-	

The different energy performance certificates distribution is quite different between demo sites. Indeed, in terms of class distribution:

- 100% of Beckerich buildings with accessible data have an energy certificate of D or better;
- 75,8% of the Dublin's buildings with accessible data have an energy certificate of D or better;
- 27,9% of the Milan's buildings with accessible data have an energy certificate of D or better, with a median value of F;
- 0,9% of the Laredo's buildings' surface with accessible data have an energy certificate of D or better, with a median value of G.

Given that Energy Certificate class values change between countries (example: a class D energy certificate in Luxembourg has a limit value of 140 kWh/(m².year) whereas in Ireland it is of 260), the average annual energy consumption over the total building's surfaces gives a better understanding of the sites' energy performances. To further improve the data and harmonization, a modulating coefficient in relation to the climate could be applied when comparing sites (lower coefficient for extreme climate to reflect the higher efforts to maintain energy efficiency). To do so, the unified degree day of each site related to the one European Union's could be used. Given the energy performances as well as the energy costs over residents' income, all Dublin, Milan, and Laredo seem require energy efficiency interventions within the project. This is even more true for Milan and Dublin when the countries' energy mix is considered, since in 2023 they had an average energy intensity of 0,19 kgCO₂eq/kWh, whereas Spain's was around 0,14 kgCO₂eq/kWh (*Carbon Intensity of Energy Production*, n.d.).

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The data collection has yet to be improved, since both Beckerich, Dublin as well as Milan has a high number of buildings with no information on them (ranging from 60% in Dublin to 96% in Beckerich). This is mainly due to the fact that Energy Certificates are mandatory for new buildings since 2006. In the same way, data was gathered in terms of number of buildings, and not surfaces.

Such a gap will have to be filled with complementary data, either measured or simulated within the ICL tool.

6.2 Mobility and Transport performances

Table 15 – Mobility and transport KPI baseline table

Indicator		Unit	Beckerich	Dublin	Milan	Laredo
Distribution of residents modal split		%	Soft: 10,5 PT: 29,5 Car: 60	Soft: 55,8 PT: 16,4 Car: 27,8	Soft: 9,0 PT: 48,0 Car: 43,0	Soft: 100 ^a PT: 0,0 Car: 0,0
Walkability within 15 min to services (standard speed)	Educational facilities	%	47,6	N.D.	100	100
	Sports facilities		58,4	N.D.	100	100
	Health facilities		66,7	N.D.	100	100
	Shops		87,9	N.D.	100	100
	Leisure services		57,1	N.D.	100	100
	Culture and recreational facilities		61,2	N.D.	100	100
Walkability within 15 min to services (vulnerable people speed)	Educational facilities	%	36,8	N.D.	94,8	100
	Sports facilities		27,9	N.D.	43,7	77,1
	Health facilities		47,9	N.D.	4,2	100
	Shops		68,2	N.D.	75,6	100
	Leisure services		39,6	N.D.	59,1	95,4
	Culture and recreational facilities		42,3	N.D.	14,7	100

^aThis number reflects the transport within the demo site area but not all the transport of residents, including outside the demo site area.

Residents transport in Dublin and Milan is dominated by soft mobility and public transport, with 28% and 43% of private car use, respectively. In such large cities, alternative options than private cars are often available to access to basic services. This is reflected by the walkability indicator for Milan where all residential buildings in the REGEN area have access to basic services within 15 min walk, using standard speed. We can nevertheless notice that the access to these services with a lower speed to reflect vulnerable people

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difficulties is much lower, in particular for health facilities and cultural / recreational facilities. This highlights the need to further improve the accessibility for some services. The use of soft mobility and public transport could be further fostered via better mobility infrastructures, subsidies or awareness campaigns.

Concerning Beckerich, the use of private cars is very high. This can be explained by the remote location of the demo site and the relatively poor offer of public transport (3 bus lines available on a daily basis, with a weekly frequency between 1 to 2 buses/hour(*Mobilitééit Lux*, n.d.)). Considering the high revenues of residents (71 k€ annually on average), the barriers to use alternative options than private cars are not necessarily economic but can be explained by the lack of accessibility of services, of public transport or by cultural aspects. Regarding the accessibility to basic services, the walkability scores are often below 60% (at standard or vulnerable people speed), reflecting an improvement margin.

As for Laredo, only soft mobility is possible within the Puebla Viejas. We can also notice that the walkability to basic services is very high, even considering the speed of vulnerable people. Nevertheless, mobility is an important subject when looking at Laredo. Its main issue lays in Laredo's continuously growing elderly population and the significant share of steep streets, representing a barrier for vulnerable people. Therefore, the demo site should try to focus some of its interventions in order to improve older people's mobility within the site.

6.3 Circular Economy performances

Table 16 – Circular economy KPI baseline table

Indicator	Unit	Beckerich	Dublin	Milan	Laredo
Non-hazardous CDW diverted from landfill	%	60,90	82	79,8	75,7

The collected data for waste treatment is limited at this stage and not harmonized between demo sites. For instance, both Beckerich's (EUSTAT, 2016) and Dublin's(Environmental Protection Agency, 2024) data have a national perimeter, related to overall waste, whereas Milan and Laredo have a smaller scope, related to C&D waste only. Given that European policies (EU taxonomy) have a general objective of diverting non-hazardous Construction and Demolition Waste of 70%, the results show that Beckerich could improve their C&D waste management by implementing different interventions within their site.

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Concerning waste reuse, there exists no real national data at the moment. Nevertheless, European data shows that only 1% of building elements are usually reused (FCRBE - *Facilitating the Circulation of Reclaimed Building Elements in Northwestern Europe*, 2023). Collecting elements data for any of the demo site's buildings through different methods and tools (example RBIM) will help improve the reuse potential of the demo sites.

6.4 AFOLU performances

Table 17 – AFOLU KPI baseline table

Indicator	Unit	Beckerich	Dublin	Milan	Laredo
Green space area within the site	m ² /inh	2467	87,5	25	7,6
Share of public green areas within the total green areas of the site	%	43,2	>90	46,5	16,9
Soil permeability index of the site	-	0,67	0,31	0,23	0,20
Soil biodiversity index of the site	-	0,96	0,17	0,225	0,21

Given its location and inhabitants' density, Beckerich is surrounded by nature and hence scores very high on the different AFOLU indicators. The green space area within the site being quite high, its only flaw remains its share of public green areas below 50%. Nevertheless, the accessible green space areas/inhabitant is still very high.

Dublin and Milan have an acceptable ratio for green spaces/inhabitants, whereas Laredo's ratio could be improved, given that not only the project has a small number of green spaces, but they are not necessary publicly accessible.

All Dublin, Milan and Laredo have acceptable permeability index, whereas their biodiversity index remains low. For that reason, creating green spaces as well as implementing nature-based solution within the demo sites could very beneficial for the 3 sites.

7 REGEN approach per demo site

After determining the starting point for each demo site and establishing the baseline for key performance indicators (KPIs), the next crucial step is to identify the interventions that will facilitate the urban regeneration processes for each demo site. To achieve this, we have utilized the Catalogue of Interventions developed in Task 2.1. Each demo site has selected several interventions from various domains of urban regeneration.

In the following sections, we present this initial set of interventions for all demo sites. We also discuss how these interventions align with the existing policies, regulations, and initiatives specific to each demo site. This alignment ensures that the interventions are not only effective but also compliant with local frameworks, thereby enhancing their potential for successful implementation and long-term sustainability.

By carefully selecting and aligning these interventions, we aim to support the unique urban regeneration goals of each demo site, fostering sustainable development and positive community impact.

7.1 Domains of Intervention

The REGEN catalogue of interventions for urban regeneration (T2.1) covers technical (building or district-scale) and sustainability domains and aims to increase the well-being and economic prosperity of citizens in a low-carbon, sustainable built environment by ensuring high indoor and outdoor quality and affordability of renovation solutions.

The catalogue is constituted by the main innovative interventions REGEN plans to develop and deploy in the demo sites. The Catalogue of Interventions for neighbourhood regeneration has been structured following the taxonomy of thematic areas within Net Zero Cities Thematic Areas which are aligned with the European Missions – 100 climate-Neutral and Smart Cities by 2030 Info Kit for Cities (European Commission, 2021) and have been defined and organized following four relevant sectors needed in the climate neutral city transition (Built environment, Energy systems, Mobility and transport, Green industry) and three enabling fields (circular economy, nature-based solutions, digital solutions).

Following these inputs and having discussed the extent and focus of the REGEN Interventions with all the partners and the piloting Demo sites and, ensuring alignment with the Assessment Framework for Urban Regeneration indicators (AFUR indicators T2.5), NBenefit\$ and EU policies, the catalogue has been structured in the following six domains: This structure ensures a comprehensive approach to urban regeneration.

1. Built Environment

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2. Energy Systems
3. Mobility and Transport
4. Circular Economy
5. AFOLU (Agriculture, Forestry, and Other Land Use; including NBS)
6. Green Industry.

The initial set of interventions includes 49 interventions, but this number can be increased during the project.

At this initial stage and once the demo sites have their diagnosis and their KPI baseline calculations done 33 interventions have been identified by the demo sites so far:

Table 18 – Table of interventions identified by the different demo sites.

DOMAINS	SubDomain	N°	INTERVENTIONS	BECKERICH	MILAN	DUBLIN	LAREDO
Built environment	Improve building performance (retrofit, planning and construction)	1	Deploy passive solutions to develop energy-efficient buildings.				
		2	Apply passive-building design strategies: orientation, passive heating and cooling				
		3	Measuring smart readiness in buildings from Energy Community				
	Improve quality of digital infrastructures	6	Improve technological networks towards a more sustainable city.				
	Conservation of building stock	7	Provide new uses to empty establishments and/or buildings (abandoned / empty / infraused).				
		8	Rehabilitate and use the buildings in historic districts to avoid heritage loss.				
Energy systems	Reduce energy use in communities	9	Deploy active solutions to reduce buildings energy needs.				
		10	Educate citizens on their energy use to facilitate energy savings in buildings (utilise smart metering, promote the use of monitoring apps and/or automated systems)				
		11	Performing Energy Analysis and modeling (using IES tool) to improve energy savings				
	Provide sustainable energy sources	14	Setting up energy communities (legal entity) to manage the renewable energy consumption.				
Mobility and transport	Reduce vehicles impacts	20	Reduce public area dedicated to Vehicles to limit vehicles access to city center.				
	Promote Public Transportation	21	Deploy Multimodality connection and promote use.				
		22	Enhance public transportation options to promote use.				
		24	Improve accessibility in Public Transportation (wheelchair accessible, universal accessibility facilities: audio, visual...) to promote use for all				
	Facilitate Active Mobility	25	Extend bike network, such that any destination can be reached safely by bike				
		26	Integration of retail and other economic activities (e.g. tourism) in urban core to enhance active mobility.				
		27	Foster and prioritize pedestrian walkability to avoid vehicle use.				
		28	Manage mobility behaviour (pedestrian, motorized, transportation...) to address the carrying capacity and human traffic				
	Improve urban physical accessibility	29	Deploy accessible pathways for older people and people with disabilities.				
Circular economy	Improve utility infrastructures	31	Manage waste sustainably to mitigate impact				
		32	Manage water resources sustainably for the full water cycle, optimising the use and repurposing of rainwater.				
		33	Drain stormwater sustainably by infrastructure development and				
	Awareness on resource-efficient economy	34	Promote and awareness raising of reuse and recycling in infrastructures and construction				
	Circularity in construction sector	35	Conceive modular buildings according to Circular Economy principles.				
		36	Deconstruct existing buildings by increasing reuse and high-value recycling, and reducing backfilling and waste				
		37	Develop urban mining of materials and components for augmenting local re-use and recycling.				
AFOLU - Agriculture, forestry and other land use	Greener and healthier urban spaces	38	Increase green areas to promote ecosystem services (ESS)				
		39	Unseal built parcels and monitor net-zero land uptake to improve ecosystem health and the provision of ecosystem services				
		41	Implement urban interventions to reduce heat islands and reduce				
	Cultural ecosystem services	42	Install urban furniture, vegetation, or noise barrier structures to absorb, block or deflect sound waves				
		44	Increase free spaces and leisure activities next to settlements.				
Green industry	Foster lower emissions tourism	46	Develop a more sustainable tourism sector to reduce its environmental impact.				
Transvesal	Neighbourhood Regeneration Office	49	Neighbourhood Regeneration Office				

7.2 Alignment to existing policies, regulations, or initiatives

7.2.1 Beckerich

The Beckerich demo site contributes and implements the national policies linked to urban development, energy efficiency and circularity.

The Pacte Climat is a mutually binding commitment between the Commune and the State and is a major instrument for implementing the objectives of the Integrated National Energy and Climate Plan (PNEC), see attached document. The commune of Beckerich is part of the national climate objective that Luxembourg has set itself in its integrated national energy and climate plan, intending to achieve the EU's 2030/2050 targets for renewable energies and energy efficiency. Among the tools available to support local Pacte Climat 2.0, which offers a catalogue of measures and support from specialized climate advisors.

Also, as part of the new European Directive on the Energy Performance of Buildings adopted in April 2024, additional rules have been established for all public buildings, to significantly reduce greenhouse gas emissions and energy consumption in EU buildings by 2030. At the same time, the new European directive on energy efficiency introduces a new obligation to renovate buildings owned or occupied by public owned or occupied by public bodies, including local authorities. To support this transition, the integrated national energy and climate plan (PNEC) provides for the development of a specific decarbonization strategy for state administrations, as well as taking into account the need for additional resources sector when transposing the above-mentioned directive into national law. directive into national law.

The REGEN interventions have been selected to support the implementation of these policies as reflected in **Error! Reference source not found.**

Table 19 – Table of interventions for Beckerich.

Main Focus	Sector	Intervention	Domain
Reduce GHGs	Residential, commercial, public	Deploy passive solutions to develop energy efficient buildings	Built environment
Reduce GHGs	Residential, commercial, public	Measuring smart readiness in building from Energy Community	Built environment.

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Main Focus	Sector	Intervention	Domain
Improve Infrastructures	District	Improve technological networks towards a more sustainable locality	Built environment.
Conservation of the building stock, GHGs	Residential, commercial, public	Rehabilitate and use the buildings in historic districts to avoid heritage loss	Built environment.
Reduce energy use in buildings, GHGs	Residential, commercial, public	Deploy active solutions to reduce buildings energy needs	Energy systems
Reduce energy GHGs	Residential, commercial, public	Educate citizens on their energy use to facilitate energy savings in buildings (utilize smart metering, promote the use of monitoring apps and/or automated systems)	Energy systems
Reduce GHGs	Residential, commercial, public	Performing Energy Analysis and modelling (using IES tool) to improve energy savings	Energy systems
Reduce GHGs	Residential, commercial, public	Deploy district heating network to have more sustainable energy sources	Energy systems

Table 20 – Table of interventions in the Circular Economy domain for Beckerich.

Main Focus	Sector	Intervention	Domain
RE, LS	District	Promote and awareness raising of reuse and recycling in infrastructures and construction	Circular economy
GHG, LS, PM, RE	Intervention	Deconstruct existing buildings by increasing reuse and high-value	Circular economy

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Main Focus	Sector	Intervention	Domain
		recycling, and reducing backfilling and waste	
GHG, RE, LS	District	Develop urban mining of materials and components for augmenting local re-use and recycling	<i>Circular economy</i>

Concerning the “Canton de Rédange” regional vision 2035 - 2050 and the PAG of the Commune of Beckerich, two development trends are based on 2 rates (a growth rate of 1.85% (last 10 years) and a growth rate of 2.1% (last 5 years). The development of Beckerich, Oberpallen and Hovelange as residential areas is encouraged. The demographic evolution requires a reorganization of the school infrastructure, including the construction of a new school campus in Hovelange.

And the existing school adjoining the Commune's building will be converted into office space for the Commune's needs, while other spaces could also be used for other functions. The existing building typologies (commune and school) are to be analyzed to verify the potential for reusable and recyclable resources. For this to happen, we need to improve professional practices and get the public on board with the concept.

The municipality that signed the Climate Pact is encouraged to engage in circular economy initiatives. The circular economy aims to significantly reduce waste, thus reducing consumption and waste of resources or raw materials.

Obviously establishing a circular economy does not happen overnight and involves a multitude of stakeholders in society. The municipality is an important link in this chain, on the one hand because aspects of the circular economy concern it as an economic actor, on the other hand because it can initiate and facilitate the implementation of the circular economy among citizens and businesses.

The circular economy not only allows better protection of resources, the environment and the climate, but also economic benefits as well as a strengthening of social cohesion through sharing and repairing activities.

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Table 21 – Table of interventions identified in the AFOLU domain for Beckerich.

Main Focus	Sector	Intervention	Domain
Reduce GHGs, PM, CU, LS	District	Unseal built parcels and monitor net-zero land uptake to improve ecosystem health and the provision of ecosystem services	AFOLU
Reduce GHGs, PM, CU, LS	District	Install green roofs and walls to regulate indoor air temperature and save energy, purify air, increase biodiversity, provide rainwater buffer	AFOLU

7.2.2 Laredo

As has been reflected in the description of the intervention area in section 3.2, the Puebla Vieja of Laredo is a protected historical site, something which largely delimits the areas of action and its level of scope.

Concerning the **Built Environment**, the Regional Government is the main ruler of spatial planning, town planning, coastal planning, and housing.

The current regulation is Act 5/2022, of 15 July, on Spatial and Urban Planning of Cantabria, although the regional spatial planning instruments were created within the framework of the previous act of 2001. Laredo is also a coastal site and, therefore, it is affected by a regional coastal management plan (*Plan de Ordenación del Litoral*, 2004).

At the municipal level, the urban planning and management tools in force are the General Urban Development Plan of Laredo (*Plan General de Ordenación Urbana de Laredo*, 1987) and the Special Plan of the Puebla Vieja (*Plan Especial La Puebla Vieja*, 1999).

In general terms, the regulations mentioned above are intended to respond to the new challenges of modern society, such as the ageing of the population and of the building stock, adaptation to climate change, rural depopulation, the change in the economic model, and the fulfilment of the objectives of the 2030 agenda. All of this is inspired by the principle of sustainable territorial and urban development.

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The heritage character of the Puebla Vieja is addressed through political actions at the local and regional level through subsidies and actions aimed mainly at the conservation of cultural heritage, its accessibility, and the quality of life for its inhabitants.

- The Government of Cantabria has different lines of aid for the rehabilitation and improvement of accessibility applicable to the Puebla Vieja:
Decree 80/2024, of 10 October, which regulates the granting of aid under the program for improving accessibility in and to housing under the State Plan for access to housing 2022-2025.
- Subsidies to individuals and companies for protecting civil properties that are part of the Cultural Heritage of Cantabria.
- Also, the Laredo Town Council has had in force since 2001 *the Municipal Ordinance* regulating the Granting of Financial Aid for the carrying out of Rehabilitation Works on Roofs, Façades, Portals, and Structures in La Puebla Vieja de Laredo, with annual calls for subsidies.
- In the field of **Social Inclusion and Community Development**: the Government of Cantabria and Laredo City Council signed an agreement in 2024 to finance the construction of a batch of energy-efficient housing for social renting in La Puebla Vieja. *Next Generation EU funds* finance this action within the framework of the *Spanish Government's Recovery, Transformation, and Resilience Plan*.

All these regulations, subsidies, and actions are aligned with the interventions in the **Built Environment** and **Energy systems** areas.

Table 22 – Table of interventions identified in the built environment and energy systems domains for Laredo.

Main Focus	Scale	Intervention	Domain
Reduce GHGs	BUILDING	Deploy passive solutions to develop energy-efficient buildings.	Built environment
Reduce GHGs	BUILDING	Measuring smart readiness in buildings from Energy Community	Built environment

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Main Focus	Scale	Intervention	Domain
Improve infrastructures	DISTRICT	Improve technological networks towards a more sustainable city.	Built environment
Conservation of the building stock	BUILDING	Provide new uses to empty establishments and/or buildings (abandoned / empty / non used).	Built environment
Conservation of the building stock	BUILDING	Rehabilitate and use the buildings in historic districts to avoid heritage loss.	Built environment
Reduce energy use in buildings	BUILDING	Deploy active solutions to reduce buildings' energy needs.	Energy systems
Reduce energy use in buildings	BUILDING	Educate citizens on their energy use to facilitate energy savings in buildings (utilize smart metering, promote the use of monitoring apps and/or automated systems)	Energy systems
Sustainable energy sources	DISTRICT	Setting up energy communities (legal entity) to manage renewable energy consumption.	Energy systems

With regards to **Mobility and Transport**, the municipality does not have a Mobility Plan, although there are initiatives for improvement, in collaboration with the Government of Cantabria, such as the construction of a 2.7 km long cycle lane in the center of the municipality or the project to install mechanical ramps and a lift in Calle Merenillo which will connect the Ensanche area with the higher area of the Puebla Vieja. These initiatives are aligned with the following REGEN interventions:

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Table 23 – Table of interventions identified in the Mobility and Transport domains for Laredo.

Main Focus	Scale	Intervention	Domain
Reduce GHGs, PM	DISTRICT	Foster and prioritize pedestrian walkability to avoid vehicle use.	Mobility and transport
Reduce GHGs, PM	DISTRICT	Manage mobility behaviour (pedestrian, motorized, transportation...) to address the carrying capacity and human traffic	Mobility and transport
LS	DISTRICT	Deploy accessible pathways for older people and people with disabilities.	Mobility and transport

Laredo is a town in which tourism is a determining factor in its economic, social, and cultural configuration, in this sense, the **Green Industries** linked to sustainable tourism and cultural tourism are key factors for the Laredo Town Hall. Laredo actively works in the promotion of cultural itineraries that cross its territory and that provide values of community, diversity, and inclusion on a European scale, such as The Saint James Way, The Last Journey of Emperor Charles V, or the Hansa Route, on which work is currently underway. These activities aligned with the following interventions:

Table 24 – Table of interventions identified in the Mobility and Transport and green industries domains for Laredo.

Main Focus	Scale	Intervention	Domain
Reduce GHGs, PM	DISTRICT	Integration of retail and other economic activities (e.g. tourism) in the urban core to enhance active mobility.	Mobility and transport
Reduce GHGs	DISTRICT	Develop a more sustainable tourism sector to reduce its environmental impact.	Green Industries

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Finally, it is worth highlighting the Integral Strategic Plan for the Historic-Artistic Ensemble of the Old Town of Laredo, which has the year 2030 as its horizon and has an impact in the field of citizen action in the improvement of spaces, new uses, and accessibility. This REPUEBLA strategic plan is aligned with all the already identified interventions, and the following ones centered in creating greener and healthier urban spaces:

Table 25 – Table of interventions identified in the AFOLU domain for Laredo.

Main Focus	Scale	Intervention	Domain
Reduce GHGs, PM, CU, LS	DISTRICT	Increase green areas to promote ecosystem services (ESS)	AFOLU
Reduce GHGs, PM, LS	DISTRICT	Install urban furniture, vegetation, or noise barrier structures to absorb, block or deflect sound waves	AFOLU
Reduce GHGs, PM, CU, LS	DISTRICT	Increase free spaces and leisure activities next to settlements.	AFOLU

7.2.3 Milan

REGEN aligns with the objectives of the City of Milan, particularly with the concept of the “15-minute city” and sustainability initiatives such as the C40 Urban Nature Accelerator. The REGEN approach, through the creation of the NRO and the implementation of green and walkable spaces, supports these goals and contributes to a more livable and sustainable urban environment.

In this context, the action plan includes both public and private building energy efficiency strategies. For public buildings, the focus is on deep renovation projects, particularly in areas such as public housing and non-residential buildings like schools, offices, and cultural facilities. The goal is to improve energy efficiency and reduce energy consumption, contributing to the broader climate adaptation and mitigation efforts set out in the PAC, Milan’s Air and Climate Plan, adopted in February 2022.

The PAC outlines 49 concrete actions aimed at reducing air pollution and protecting the environment, with milestones for 2030 and a long-term goal for 2050. In parallel, the private sector will be engaged through tailored

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strategies for large real estate holdings and diffuse property ownership. By offering financial, participatory, and technical support, the goal is to drive energy-efficient renovations across the city. It is estimated that these efforts will avoid 500 GWh of gas consumption for heating by 2030, making a significant contribution to Milan's sustainability targets.

The Air and Climate Plan is organized into five key areas:

1. **Healthy and Inclusive Milan:** A clean, equitable, open, and supportive city.
2. **Connected and Highly Accessible Milan:** A city that moves sustainably, flexibly, actively, and safely.
3. **Energy-Positive Milan:** An urban system that consumes less and better, with a zero-emission building stock and a smart urban energy system powered by 100% renewable sources.
4. **Cooler Milan:** A greener, fresher, and more livable city that adapts to climate change.
5. **Aware Milan:** A conscious city, in which citizens and actors in the urban system make sustainable choices and adopt responsible lifestyles, reducing the impact on atmospheric emissions, energy consumption, average urban temperature rise and waste production.

For each area, specific actions are outlined to improve the quality of life in the city, including reducing pollutant emissions, promoting sustainable mobility, increasing urban greenery, and implementing an action program for a circular economy. Air and Climate Plan activities aimed at citizens and stakeholders can be explored in more detail at the Milano Cambia Aria page: <https://www.comune.milano.it/web/milano-cambia-aria>

Additionally, in October 2024, Milan's Climate City Contract received the approval label from the European Commission, affirming the city's commitment to achieving climate neutrality by 2030. The contract, signed by the municipal administration alongside 25 stakeholder organizations—including public utilities, universities, businesses, housing cooperatives, civil society organizations, philanthropic foundations, and innovation think tanks—was presented in March 2024 as part of the EU Mission Climate-Neutral and Smart Cities.

All the areas outlined in the Plan are closely linked to REGEN. Below each table, the objectives of the Climate Air Plan are detailed, along with the specific actions designed to achieve the desired outcomes:

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Table 26 – Table of interventions identified in the Built Environment and Energy System domains for Milan.

Main Focus	Scale	Intervention	Domain
Reduce GHGs	INTERVENTION AREA	Deploy passive solutions to develop energy-efficient buildings + apply passive-building design strategies	Built environment
Improve infrastructures	TERRITORIAL AREA	Improve technological networks towards a more sustainable city.	Built environment
Reduce GHGs, PM, RE	INTERVENTION AREA	Deploy active solutions to reduce buildings' energy needs.	Energy systems
Reduce GHGs	TERRITORIAL AREA	Educate citizens on their energy use to facilitate energy savings in buildings (utilize smart metering, promote the use of monitoring apps and/or automated systems)	Energy systems
Sustainable energy sources	INTERVENTION AREA	Performing Energy Analysis and modeling (using IES tool) to improve energy savings. Deploy district heating network to have more sustainable energy sources.	Energy systems

Objective 3.2 Decarbonization of 50% of municipal building consumption.

- Action 3.2.1: Redevelopment of municipal building stock. The action involves creating and implementing a plan to improve energy efficiency by upgrading municipal buildings through deep renovation in the following key areas: Public residential buildings (ERP): about 29,000 units managed by MM Casa; Non-residential buildings: schools; offices, social, recreational, cultural centers, multifunctional structures,

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archives. Museums, house-museums, historic buildings, pavilions, theaters, cinemas, cemeteries, offices, storage, etc.

The priority measure is to fully replace diesel systems with renewable energy systems, with a target deadline of 2021. Additional widespread energy-saving interventions will focus on indoor lighting and summer air conditioning.

Objective 3.3 Redevelopment of private building stock;

- Action 3.3.1: Private building stock efficiency strategies. The action will define a strategy for improving energy efficiency in private buildings, particularly: large real estate holdings, through an initial consultation with property owners and managers to identify a regulatory framework for energy-efficient renovation, to be incorporated into a future revision of the Urban Planning Plan (PGT), along with the implementation of pilot projects; and diffuse property ownership, by defining both financial and participatory support tools, as well as technical assistance. It is estimated that this measure, with an increase in deep renovation interventions by 2030, will avoid the consumption of 500 GWh of gas for heating.

These initiatives align with Milan's goal of achieving climate neutrality by 2030 and resilience by 2050.

Table 27 – Table of interventions identified in the Mobility and Transport domains for Milan.

Main Focus	Scale	Intervention	Domain
PM, LS	TERRITORIAL AREA	Reduce public area dedicated to Vehicles to limit vehicles access to city center.	Mobility and transport
Reduce GHGs, PM, RE	TERRITORIAL AREA	Deploy Multimodality connection and promote use. - Enhance public transportation options to promote use.	Mobility and transport
LS	TERRITORIAL AREA	Improve accessibility in Public Transportation (wheelchair accesible, universal accesibility facilities: audio, visual...) to promote use for all	Mobility and transport
GHG, PM, LS	TERRITORIAL AREA	Extend bike network, such that any destination can be reached safely by bike	Mobility and transport

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Main Focus	Scale	Intervention	Domain
GHG, PM, LS	TERRITORIAL AREA	Integration of retail and other economic activities (e.g. tourism) in urban core to enhance active mobility.	<i>Mobility and transport</i>
PM, LS	TERRITORIAL AREA	Foster and prioritize pedestrian walkability to avoid vehicle use.	<i>Mobility and transport</i>
GHG, PM, L	TERRITORIAL AREA	Manage mobility behaviour (pedestrian, motorized, transportation...) to address the carrying capacity and human traffic	<i>Mobility and transport</i>
LS	TERRITORIAL AREA	Deploy accesible pathways for older people and people with disabilities.	<i>Mobility and transport</i>

Objective 2.1: Net reduction in personal motorized mobility for private use.

- Action 2.1.1: Remodeling of Area B rules. A revision of the access and circulation rules in the ZTL "Area B" will contribute to air quality objectives by reducing particulate emissions from mechanical friction.
- Action 2.1.2: Planning actions for sustainable urban mobility. A revision of urban mobility governance policies (PUMS - Sustainable Urban Mobility Plan, and PGU - General Urban Traffic Plan) and the reorganization of parking (PUP - Urban Parking Program, or new parking planning tools) will be implemented, integrating the actions outlined in Actions 2.1.1 and 2.1.3, with the aim of significantly reducing private vehicle mileage for passenger transport by 2030.
- Action 2.1.3: Agreements with supra-municipal entities to improve transportation gravitating to Milan. The action will promote the integration of urban mobility governance policies with those related to the overall mobility system surrounding the city of Milan, through agreements with supra-municipal entities for various purposes: Integration of the public transport system at the metropolitan scale; improvement of regional rail transport serving Milan; strengthening of parking and intermodal areas and implementation of metropolitan carpooling and/or ride-sharing policies.

Objective 2.2: Establish a Zero Emission Zone.

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- Action 2.2.1: Implementation of a zero-emission mobility area. In line with the commitment made through the Fossil–Fuel–Free Declaration, signed on 23/10/2017 as part of C40 network initiatives, the historic center of Milan, currently affected by congestion and "urban heat island" phenomena, will become a "zero-emission" mobility zone by 2030, creating better environmental conditions for all users.

Table 28 – Table of interventions identified in the Circular Economy domains for Milan.

Main Focus	Scale	Intervention	Domain
RE, LS	TERRITORIAL AREA	Manage waste sustainably to mitigate impact	<i>Circular economy</i>
W, LS	TERRITORIAL AREA	Manage water resources sustainably for the full water cycle, optimising the use and repurposing of rainwater.	<i>Circular economy</i>
W, LS	TERRITORIAL AREA	Drain stormwater sustainably by infrastructure development and management.	<i>Circular economy</i>
GHG, PM, RE, W	INTERVENTION AREA	Conceive modular buildings according to Circular Economy principles.	<i>Circular economy</i>

The PAC of Milan promotes sustainable practices through key policies:

Waste Management: Circular economy strategies include waste reduction and green procurement for public events to minimize environmental impacts.

Objective 1.7: Circular Economy

1. Equip the administration with an action program for the circular economy.
2. Actions for Reduction of waste production and for the Lower consumption of raw materials.
4. Application of green criteria to all purchases by the Municipality and Participated Companies.
5. Introduction of green criteria for public or private events organized in Milan.

Modular Construction: Principles of circular economy are applied to sustainable building practices, emphasizing energy efficiency and modular designs

Water Resource Management: Policies focus on optimizing rainwater reuse and stormwater drainage via green infrastructure and depaving initiatives

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Objective 4.3: Milan “Sponge City”

Land consumption in Milan is very high, with approximately 70% of the territory covered by impermeable surfaces, reducing the soil's ability to absorb rainwater and increasing the risk of flooding. This action aims to green the city by converting impermeable grey areas into green spaces and implementing water storage and infiltration systems through nature-based solutions (NBS), in a widespread manner.

- Action 4.3.1: Depavimentation: increase drainage area in the city. The action involves the de-paving of residual public grey areas and encouraging similar interventions in private properties. The goal is a significant reduction of residual impermeable grey areas, converting them into permeable green spaces, aiming to halve their surface area by 2030.
- Action 4.3.2: Reduce hydraulic risk and decrease the inflow of water rainwater to the sewer system. The action aims to cool the urban environment by promoting green roofs and walls, even in areas with limited space or underground utilities. This widespread initiative enhances city livability, provides new social and recreational spaces, and creates jobs in the green and renewable energy sectors. Green roofs offer opportunities for gardens, urban farms, and the installation of renewable energy systems, especially on public or publicly accessible private buildings.

Table 29 – Table of interventions identified in the AFOLU - Agriculture, forestry and other land use domains.

Main Focus	Scale	Intervention	Domain
RE, LS	TERRITORIAL AREA	Increase green areas to promote ecosystem services (ESS)	AFOLU
GHG, PM, L	TERRITORIAL AREA	Implement urban interventions to reduce heat islands and reduce energy needs	AFOLU
GHG, PM, CU	INTERVENTION AREA	Install urban furniture, vegetation, or noise barrier structures to absorb, block or deflect sound waves	AFOLU

The PAC also provides concrete interventions in this area, to achieve the **Objective 4.2: Urban cooling and reduction of the “heat island” phenomenon.**

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To achieve this objective, the following actions are implemented:

- Action 4.2.1: Urban forestation interventions and increase of green surfaces. The action aims to ensure greater accessibility and quality of green spaces, green infrastructure, and public services for all population groups, while ensuring their safe use. For equity purposes, the plan has assessed the social vulnerability of the urban system, identifying areas with higher concentrations of vulnerable populations.
- Action 4.2.2: Diffusion of green roofs and walls. The action aims to cool the urban system by promoting green roofs and walls, even in areas with limited space or underground utilities. This widespread implementation creates a sustainable regeneration system that enhances city livability, provides new spaces for socializing and recreation, and generates jobs in the green sector and, indirectly, renewable energy industries. Roofs offer opportunities for new green spaces, gardens, urban farms, and the installation of renewable energy systems. Specifically, creating multifunctional green areas on public or publicly accessible private roofs will provide new social spaces for everyone.
- Action 4.2.3: School cooling with urban forestation interventions, NBS, energy efficiency and natural ventilation systems. The Milano School Oasis action will enhance school buildings and courtyards to reduce the heat island effect and create "climate refuges" open to the public after school hours and in summer. Interventions will include planting, de-paving courtyards, and improving building envelopes with solar panels, energy efficiency upgrades, and green roofs or facades. Nature-based solutions (NBS) will play a key role, and outdoor education will complement these structural improvements.
- Action 4.2.4: Reducing the area of public parking lots directly exposed to the sun. The action focuses on improving urban cooling by intervening in one of the main areas responsible for the urban "heat island" effect: surface-level public parking lots directly exposed to solar radiation. These spaces significantly contribute to the rise in temperatures in cities, creating a hot microclimate that impacts urban comfort and health. Targeted interventions in this area can help reduce heat and improve environmental conditions.
- Action 4.2.5: Parking and related services in vertical structures to reduce land consumption and climate impact.

It is important to highlight that many of these actions influence more than one domain of REGEN, making the PAC (Action Plan) a comprehensive tool that can function in combination with other improvement plans for Milan.

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This integrated approach allows for a holistic strategy that addresses various urban challenges simultaneously, from sustainability and energy efficiency to social inclusion and environmental resilience. By aligning different initiatives, the PAC can maximize impact, fostering synergies that benefit the city's long-term development. Through collaboration with other plans, REGEN's goals can be achieved more effectively, contributing to Milan's transformation into a smarter, greener, and more livable urban space.

7.2.4 Dublin

As outlined in Section 5 the Dublin Demo site corresponds with the area of the Decarbonisation Zone (DZ) set up in the 2024 – 2029 Climate Neutral Dublin 2030 (*Dublin City Council Climate Action Plan 2024 - 2029 | Dublin City Council, 2024*). Action C4 of the plan, and in particular sub-action C4.7 *Ringsend Decarbonisation Zone* set ambitions across different sectors. It aims to advance nature-based solutions; support the deployment of district heating and to build on Sustainable Energy Communities, and active travel projects (Ringsend to College Green Active Travel Project, Dodder River Greenway) and also support circular economy.

These specific actions are aligned with a number of Dublin City Council's plans, including Capital Programme 2024-2026; Dublin City Development Plan 2022-2028; Dublin Region Air Quality Plan 2021; Dublin Agglomeration Noise Action Plan 2024-2028; Dublin City Biodiversity Action Plan 2021-2025, Active Travel Network. Dublin City Council have allocated a part of their 2024-2026 CAP budget (€124,500.00) to support a pipeline of projects set out in these plans that have a direct effect in the DZ area.

Finally, the REGEN Dublin interventions outlined below would also help meet national objectives as set out in the 2023 National Climate Action Plan; Housing for All; National Planning Framework (NPF), and the Eastern and Midland Regional Assembly's Regional Spatial and Economic Strategy.

REGEN Dublin Interventions

Table 30 – Table of interventions identified in the Energy systems Domain for Dublin.

Main Focus	Sector	Intervention	Domain
Reduce GHGs	RESIDENTIAL, COMMERCIAL, PUBLIC, INDUSTRIAL	Energy Analysis and modelling using IES' energy modelling tool	Energy systems

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Intervention [I30- *Energy Analysis and modelling using IES' energy modelling tool*] will help identify the most effective actions for decarbonising the area, aligning with the GHG reduction targets outlined in both the national Climate Action Plan and Dublin City's Climate Action Plan (CAP).

Table 31 – Table of interventions identified in the Built environment Domain for Dublin.

Main Focus	Sector	Intervention	Domain
Reduce GHGs	RESIDENTIAL, COMMERCIAL, PUBLIC	<i>Climate & Energy Office: information and proposed services to the community</i>	Built environment
Reduce energy use in buildings	RESIDENTIAL, COMMERCIAL, PUBLIC	<i>Climate & Energy Office: redesign for community space</i>	Built environment

Intervention [I31 – *Climate & Energy Office information and proposed services to the community*] and [I32 – *Climate & Energy Office: redesign for community space*] are in direct alignment with action *RF3 Re-Use of Buildings* of DCC's 2024 CAP. This action states: "We know that the lowest carbon building is one that is already built. Re-using existing buildings provides an opportunity to build on existing programmes, for example, adaptive re-use which is converting vacant commercial buildings into housing. This also aligns with the EU Performance of Buildings Directive. We will also use vacant buildings to support enterprises by identifying buildings suitable for incubation hubs and community spaces. All reuse projects will have due regard to the need to appropriately protect, conserve and enhance protected structures in accordance with protected structures legislation".

Table 32 – Table of interventions identified in the Built environment Domain for Dublin.

Main Focus	Sector	Intervention	Domain
Reduce GHGs	RESIDENTIAL, COMMERCIAL, PUBLIC	Support the energy renovation of inefficient building stock in the area	Built environment

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Intervention [I33 - *Support the energy renovation of inefficient building stock in the area*] is directly backing action B2 *Continuation of planned incremental improvement of housing stock (voids, extensions, boiler replacement, retrofit and energy efficiency programme)* from DCC's 2024 CAP. This aligns well with the national CAP targets of retrofitting the equivalent of 500,000 homes to a Building Energy Rating of B2 or cost-optimal and installing 400,000 heat pumps in existing homes to replace older, less efficient heating systems by the end of 2030. More information at the national level can be found in the National Retrofit Plan that was designed to set out how the government will deliver on these targets.

Table 33 – Table of interventions identified in the Built environment and Energy systems Domain for Dublin.

Main Focus	Sector	Intervention	Domain
Reduce energy use in buildings	RESIDENTIAL, COMMERCIAL	Educate citizens on their energy use (Utilising smart meter data)	Energy systems
Reduce energy use in buildings	RESIDENTIAL, COMMERCIAL	Measuring smart readiness in buildings from Energy Community	Built environment

Interventions [I34 - *Educate citizens on their energy use (Utilising smart meter data)*] and [I36 - *Measuring smart readiness in buildings from Energy Community*] are aligned with action C3.2 *Climate Smart Districts*. Climate Smart Districts will support increasing resilience through use of technology and data.

Table 34 – Table of interventions identified in Energy Systems Domain for Dublin.

Main Focus	Sector	Intervention	Domain
Reduce energy use in buildings	RESIDENTIAL, COMMERCIAL	Setting Up Energy Community legal entity	Energy systems

Intervention [I35 - *Setting Up Energy Community legal entity*] will directly support action S2.1 *Sustainable Energy Communities* of DCC's 2024 CAP.

The plan quotes:

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“Dublin is said to be a city of villages, and these villages have strong identities. This is a strength. Nurturing our neighbourhoods to ensure that they continue to thrive and support strong social networks is vital in preparing for climate change and preventing adverse impacts on our health and well-being, during and in the aftermath of an extreme event. We will build on our existing initiatives such as quiet zones and sustainable energy communities, pride of place, and tidy towns to increase our social, and economic resilience. A focus shall be placed on integrating climate action with considerations relating to pollinator friendly biodiversity to ensure a win-win scenario are achieved.”

8 Conclusions

The document describes a comprehensive analysis of urban regeneration across four European demo sites: Beckerich (Luxembourg), Laredo (Spain), Milan (Italy), and Dublin (Ireland). The demo sites share common challenges to go across urban regeneration but also have clear differences that make the interventions to be deployed in each of them diverse:

8.1 Common Challenges Across Demos

Energy Retrofitting: Retrofitting old, inefficient buildings is a shared need across all demos, balancing energy performance improvements with heritage preservation, particularly in areas like Laredo's Puebla Vieja and Dublin's historic maritime zones.

Mobility and Accessibility: All sites face challenges reducing car dependency, improving public transport, and creating inclusive cycling and pedestrian infrastructure. Accessibility for people with reduced mobility is a specific concern, especially in historic areas like Laredo and Dublin.

Citizen Engagement: Sustaining long-term community participation is difficult across sites. Beckerich experiences "participation fatigue," while other demos also struggle to maintain citizen interest in extended urban regeneration projects.

Balancing Development and Preservation: Demos face the challenge of modernizing urban areas while conserving their unique identities, such as Laredo's medieval character, Milan's worker housing, and Dublin's maritime and industrial heritage.

Climate Action and Sustainability: Addressing emissions, promoting renewable energy, and improving energy efficiency are universal goals. Progress varies, from Dublin's smart-city and low-carbon goals to Beckerich's advanced renewable energy initiatives.

8.2 Key Differences Between Demos

Scale and Urban Context:

Beckerich and Laredo are smaller, rural or semi-urban areas with distinct local identities.

Milan's Giambellino-Lorenteggio and Dublin's Ringsend and Poolbeg zones are urban hubs with dense populations and more complex socio-economic and infrastructure challenges.

Socio-Economic Profiles:

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Beckerich, despite being a rural dormitory town, excels in renewable energy and sustainability leadership.

Laredo struggles with seasonal economic activity, population decline, and a limited job market.

Milan's Giambellino-Lorenteggio faces energy poverty, social inequality, and a significant immigrant population.

Dublin is rapidly urbanizing, focusing on low-carbon infrastructure and tech-driven development while grappling with housing affordability.

Heritage and Urban Form:

Beckerich aligns modernization with its rural, eco-conscious vision.

Laredo operates under strict heritage regulations, limiting interventions in its medieval core.

Milan blends historic preservation with contemporary urban design in its worker-housing neighbourhoods.

Dublin works to balance modernization with its maritime and industrial legacy, particularly in densely urbanized areas.

Although all demo sites share overarching goals of sustainability, accessibility, and community engagement, their unique socio-economic, environmental, and urban contexts call for customized strategies to address their specific challenges and opportunities. The REGEN project's catalogue of interventions and toolbox will equip each site with tailored solutions to drive effective and transformative urban regeneration processes.

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