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**TERRITORY OCCUPATION AND TRANSPORTATION
SUSTAINABILITY IN MADRID**

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ABSTRACT

The usage of private cars contributes significantly to GHG emissions. This study examines the impact of changes in the land occupancy model in the Community of Madrid over the past two decades on mobility. It has resulted in a high consumption of land in the past two decades, but in a more peripheral manner, in increasingly distant nuclei, which may be explained in part by the rise in single-family dwelling. These functionally specialized growths have been sustained by a network of radial highways, resulting in a loss of density, variety, and the compact Mediterranean city model. Simultaneously, it is confirmed that the relocation of the industry and the set of increasingly peripheral and unconnected employment to the residential space, together with the change in the labor model and the scarce residential mobility, the product of a housing in property model, generates an increase in mobility due to work. Due to the difficulty of providing assistance with public transportation, the development of retail malls that are more peripheral, dependent on the road network, and unconnected to the home, leads to an increase in private vehicle travel. These developments have resulted in an increase in private car travel, with a clear loss of the proportion of public transportation, both of which contribute substantially to the production of GHGs and therefore to climate change, as well as excessive energy consumption. As a result, the land occupancy model has a noticeable impact on metropolitan mobility, necessitating cooperation between the urban and transportation models in order to achieve a more balanced region.

KEYWORDS: *Territory, Transportation, Sustainability, Mobility, Consumption.*

1. INTRODUCTION

The rise in economic activity has mirrored the rise in greenhouse gas emissions in the Community of Madrid, as shown by the rapid growth in private car usage, which peaked in 2007 with the conclusion of the housing boom. market for real estate According to statistics from the Special Euro barometer 406, which was released in 2013, half of all Europeans Only 16 percent of European people utilize public transportation on a daily basis.12% of people ride bicycles. CO₂ emissions from urban transportation account for approximately a quarter of overall CO₂ emissions. Emissions, with approximately 70% of all emissions in urban areas contributing to climate change. . The DG Climate Action report, Reducing CO₂ Emissions from Passengers, highlights the need of reducing CO₂ emissions from passengers [1].

That automobiles are responsible for about 12% of all carbon emissions in the EU CO₂ is the most common greenhouse gas. Assume for the set of cars that are dependent on traffic congestion. The annual cost to European towns is projected to be about 80,000 million Euros. 15 to 25 year's old 40% of European people are exposed to pollution levels that surpass EU standards. Degrees of quality We observe a rise in GHG emissions throughout the study period (1990–2015). Spain's emissions are not meeting the Kyoto Protocol's goal (see Fig. 1). Statistics on GHG emissions to the atmosphere in the 1990s, including data on emissions increase through 2007. Madrid is a municipality in Spain. GHGs accounted for 4.9 percent of national emissions in 1990, and 6.2 percent increase in 2010 without an equal increase in the region's economy. They reached a high of 25,665.11 Kt CO₂ equivalent in 2007. On CO₂equiv. Spain (base year = 100). C.M. Inventory of Emissions, D.G. Medio Ambiente to the ambiance of the Madrid Community From 1990 until 2015, If GHG is used as the foundation for the study of evolution in the Community of Nations The tones of CH₄ (t), CO₂ (kt), N₂O (t), SF₆ (kg), and HFC (kg) were converted to tones of CH₄ (t), CO₂ (kt), N₂O (t), SF₆ (kg), and HFC (kg) in Madrid. As a GHG inventory on CRF, CO₂ equivalent is used (Common Reporting Format). In 2017, the transportation industry produced a high of 5,852.68 CO₂ equiv. With a proportion of direct greenhouse gas emissions, the transportation sector 46.58 percent of the population. The transportation sector's overall GHG emissions have increased to 5,055.71 Kt. CO₂equiv. has increased from 8,871.86 Kt CO₂equiv in 1990 to 8,871.86 Kt CO₂equiv in 2015. Because the transportation industry is the largest emitter of greenhouse gases, expanding its role in the economy is critical. total indefinitely till the due date From 37.60 percent of the total population, From 1990 to 2015, emissions decreased by 46.58 percent [2].

GHG emissions are concentrated in the urban center, which is linked with Due to urban development, traffic and the residential sector, as well as the neighboring areas of the major thoroughfares, including the areas around Madrid Airport Figure 4 shows the situation. Furthermore, pollutants that have a direct greenhouse impact are subject to a supplementary regulation. Analysis, and if we look at the statistics for private vehicles, we can see what has previously been stated. CO₂ emissions have almost doubled since 2003, when they were 3,012 tn CO₂ equivalent. In the year 1990, being the urban driving the unique sector that has risen from 5,810 CO₂ equiv. in 2005 to 5,810 CO₂ equiv. in 2015 more when resulting in a little decrease in interurban journeys in 2007. Emissions to the atmosphere in the Madrid Community's inventory. From 1990 until 2015, A. Leboreiro Amaro, 110 A. Leboreiro Amaro, 110 A. Leboreiro The study of NO₂ shows a similar pattern, with a rise in urban areas and a decrease in rural areas. Intercity has increased from 97 t in 1990 to 208 t in 2015 since the crisis. In the case of NO₂, another factor was the rise in the number of diesel cars on the road as a result of government initiatives to promote them. NO₂ emissions are shown in Figure 6. Source C.M. Inventory of Emissions to the Environment, D.G. Medio Ambiente In the Madrid Community, there is a certain vibe. From 1990 until 2015, another cause for the rise in NO₂ emissions was due to the increased use of diesel cars [3].

The government's support of this kind of diesel this era, which includes years following the economic downturn, shows a rise in GHG emissions. Despite technological advancements, the problem may be caused by an increase in population. Duration of vehicle journeys the reasons may be based on urban growth, transportation, or other factors. Sprawl, job migration, and the development of shopping malls are all examples of this. Judgment on the past decade's urban growth, without any regional implications neither planning nor public transportation policy are linked. Figure 1 discloses the Index Of Evolution Of Emissions Of Greenhouse Gases In The Community Of Madrid And Spain (Base Year = 100) On CO₂equiv. Source D.G. Medio Ambiente, C.M. Inventory of Emissions to The Atmosphere In The Community Of Madrid. Years 1990–2015 [4]

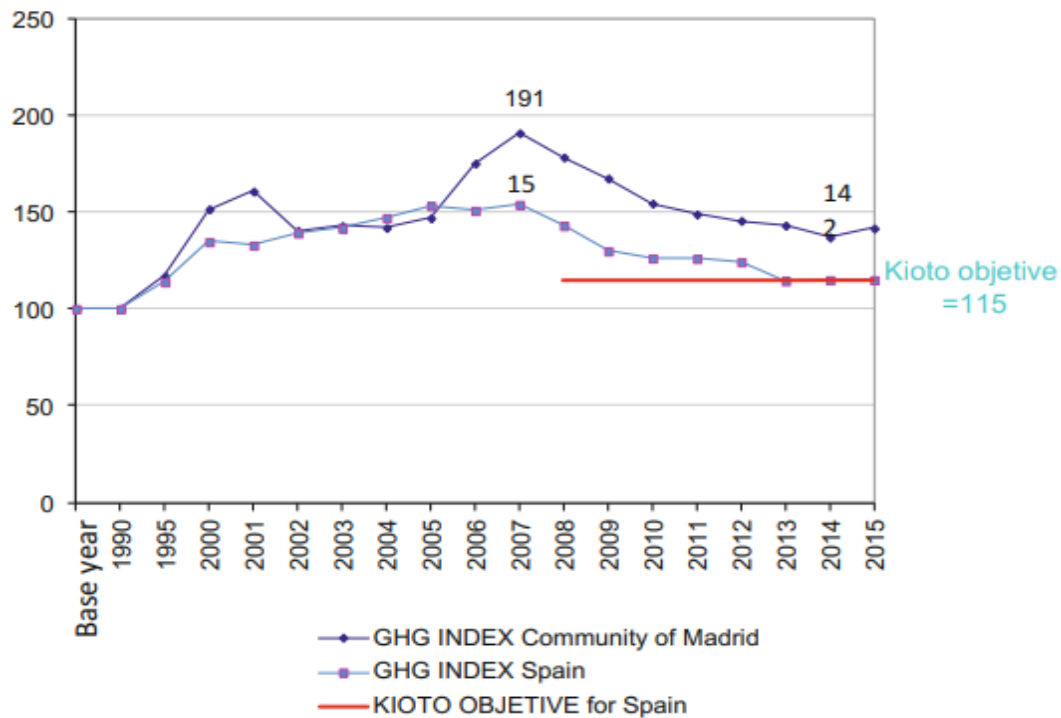


Figure 1: Index Of Evolution Of Emissions Of Greenhouse Gases In The Community Of Madrid And Spain (Base Year = 100) On CO₂equiv. Source D.G. Medio Ambiente, C.M. Inventory Of Emissions To The Atmosphere In The Community Of Madrid. Years 1990–2015

2. DISCUSSION

In the past two decades, the Community of Madrid has seen phenomena of land occupancy and usage that has led to a decrease in public transportation use. On the one hand, the Community of Madrid has seen a loss of population in the center, resulting in a decrease in the number of users of public transportation in the better-equipped central region. On the other side, this population has migrated to the periphery, to regions where public amenities are scarce. This fact resulted in the colonization of more peripheral spaces, based on the use of private vehicles and amplified by other factors such as increased income, an increase in the number of single-family houses, lower density, and activity dispersion, or the emergence of large mall centers, for example [5].

In the absence of public transportation in the new development areas, this urban expansion supported by the roads, with nonfunctional developments deficient in variety, resulted in a rise in mobility based on the use of private vehicles for business, study, shopping, and recreation. This population dispersal did not result in a trend of “in situ” job creation, adding to the residence-employment imbalance and increasing the number [6] of journeys between home and work. Simultaneously, manufacturing employment has been steadily declining in

the southern regions, while most of the region's employment is concentrated in the center, resulting in even larger imbalances than those previously stated. Aside from that, in the northern and western towns near the capital (Madrid), a large proportion of financial services is concentrated in an area with limited public transportation and a social group that prefers to use a private car for reasons of comfort and "status." As a result, the number of excellent shopping malls situated on the edge and nodes of the road network is growing, and those closest to the road have double the constructed area of the most remote retail complexes. These malls are not surrounded by homes, drawing individuals from far away who are compelled to drive their own vehicles. Because of the low density of customers in their immediate vicinity, public transportation without a significant critical mass is economically unsustainable. Increased dependence on private cars has resulted from the rise in gross floor space occupied by single-family dwellings. This occurrence happened in the year 112 A.D. Leboreiro Amaro became famous in the final decade of the twentieth century, mostly in the West, but its popularity sparked a lot of development in towns on the Community's periphery, as people sought superior environmental qualities that were lacking in the city center.

In summary, the region's unsustainable mobility is due to the lack of a comprehensive master plan that would extend new regions or rejuvenate existing cities by connecting developed lands to public transportation, which would have encouraged characteristics such as density, variety, and urban design. The density or dispersion of activities in this occupation, the interstices of undeveloped land in the territory, monoculture of single-family homes, the number of mall centers and economic activity hubs outside of residential areas; regional imbalances of employment location and incomes led to increased mobility in large metropolitan areas. Furthermore, transportation infrastructure has a detrimental influence on the environment, occupying outlying regions of high environmental value and promoting the use of private cars, both of which have significant environmental consequences.

In contrast to the "sprawl" paradigm, which consumes resources (land, materials, infrastructures, water, and energy), a plan based on the existing metropolis should be explored. Prioritizing a good quality of life through encouraging information technology and knowledge, reducing pollution, improving transportation and public space quality, reducing energy usage, and becoming more connected into their territorial environment [7].

- More compact population models, delineating urban-rural borders, and levying fees on low-density development to absorb the additional costs of transportation infrastructure and upkeep.
- Reduce automobile dependency by enacting policies that restrict transportation, such as rising fuel prices, city tolls, controlled parking, public transportation and modal interchange incentive policies, and the expansion and improvement of the public transportation network, as well as park and ride in origin.
- Implement planning regulations that restrict sprawl growth at all levels, not only at the local level, but also at the regional level, such as setting minimum densities or requiring the related costs to be socialized into the projects.
- Create a series of metropolitan institutions or voluntary cooperation organizations, primarily in transportation, to control and coordinate the policies of the various municipalities, as well as a series of metropolitan institutions or voluntary cooperation organizations, such as the Consortium of Transport of the Community of Madrid. Figure 2 discloses the Emissions Equivalent 1990–2015. Source D.G. Medio Ambiente, C.M. Inventory of Emissions to the Atmosphere in The Community of Madrid. Years 1990–2015 [8].

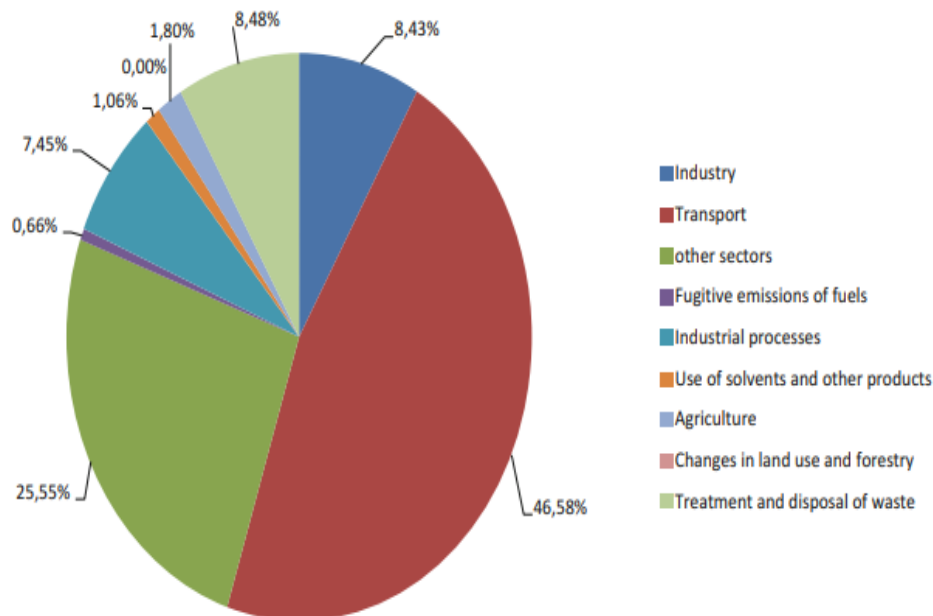


Figure 2: Emissions Equivalent 1990–2015. Source D.G. Medio Ambiente, C.M. Inventory of Emissions to the Atmosphere in The Community Of Madrid. Years 1990–2015

3. CONCLUSION

The significant increase in land occupied in the Community of Madrid, especially in more peripheral municipalities, has been examined throughout this book. Land usage not just for houses, but also for infrastructure to support that development, near to the highways, in regions of high environmental value, such as the West or North, where public transportation is inefficient. It has been reflected in a widespread decrease in population density in central areas, such as capitals or large cities in the South, and the Henares Corridor, spaces historically with high capacity public transportation, by population displacement to more remote areas, which has accompanied the decline in the use of public transportation. The growth of land occupied in a low-density, single-family home model was particularly notable in the last decade of the previous century, in remote areas or on the outskirts of existing cities, far from urban endowments and services, and without a policy for your generation to serve the population of arrival. With a rising occupancy in the region's west and north, as has been observed, but with a model that has been transferred due to its popularization to more periphery regions, depending on the price of land in the region's south and east. The dispersal of activities throughout the territory, a result of high land costs in core regions, has resulted in less variety, while the arrival of malls has resulted in a decrease in commerce in the old city, and what this implies for the livability of these places. The zoning of the territory has resulted in the weight loss of public transportation due to the occupation of large areas of land for housing,[9] or the appearance of peripheral nodes of businesses or industrial, isolated nodes and unrelated, rather than through the road network and outside the urban tissue. The usage of private cars has increased as the number of private vehicles has increased. It has a noticeable impact on the more outlying metropolitan crowns, as a result of the urban model. It has resulted in the loss of the radial model in favor of an oil stain model of islands in the territory, resulting in a higher demand for new methods to link as a result of increased transversal mobility, which leads to an increase in private vehicle journeys [10].

The paradigm that has emerged in recent decades has promoted urban expansion, with peripheral development based on land costs. This approach has increased reliance on automobiles and aided in the development of the road network. Due to the specialization of the area, by means of the placement of activity hubs peripheral outside the current city or of

new residential development, a larger imbalance of employment against dwelling develops in this phase. The loss of industrial employment in certain southern cities and its offshore to the region's border, along with the financial sector's concentration on the region's north and west perimeter, produced additional imbalances, contributing to a rise in travel and travel for work reasons. Although challenging, a series of governmental measures would be required to balance the connection between residency and work. The dispersion of activities supported by the road network, the relocation of industry outside of residential areas, further away on the outskirts of the region due to: land prices, scarce urban regulations and lower salaries, as well as the emergence of malls centers, has resulted in a loss of employment close to neighborhood, and all of this has increased the territorial unboundedness. Both regional and urban planning must be linked with an integrated transportation system design, supporting density in general and particularly near transportation interchanges, and minimizing urban growth by encouraging the regeneration of existing cities. Promoting the variety of uses inside residential areas, as well as the adoption of designs that promote more sustainable means of transportation, such as pedestrian or bicycle is critical. These steps will improve air quality, reduce resource and time consumption in transportation, and restore relational spaces in our cities, as well as improve the quality of life for all people.

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