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SUSTAINABILITY AS A GLOBAL PROBLEM IN THE CARBON ERA:

EINDHOVEN AS AN EXAMPLE OF ANTHROPOCENE CITY

LA SUSTENTABILIDAD COMO PROBLEMA MUNDIAL EN LA ERA DEL CARBONO

EINDHOVEN COMO EJEMPLO DE CIUDAD ANTROPOCENA

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Abstract_

During the last decades the issue of sustainability has emerged as a global problem due to the imminent end of our civilization and cities caused by the human interference on nature. The aim of this article is to make a review over the idea that today global problems such as climate change, the peak oil, and others, have originated the appearance of a new geological episode in our history –The Anthropocene. Focusing on the city of Eindhoven as an example of Anthropocene city, this article points out that industrial settlements are part and the main contributors of the Anthropocene period. The beginning of a new episode of the city marked mainly by the imminent the end of the fossil fuels and finites natural resources, proposes that it is necessary to renew the concepts of sustainability for preparing the city for a new period in the history.

Resumen_

Durante las últimas décadas, el tema de la sustentabilidad ha surgido como un problema de carácter mundial debido al inminente fin de nuestras ciudades y de la civilización como resultado de la intervención de la naturaleza por parte de los seres humanos. El objetivo de este artículo es pasar revista a la idea de que los actuales problemas mundiales, como el cambio climático, el cénit de la producción de petróleo y otros, han dado lugar a una nueva era geológica en nuestra historia: la era antropocena. Centrados en la cuidad de Eindhoven como ejemplo de urbe antropocena, el artículo destaca que los asentamientos industriales forman parte de esta era y son sus principales contribuyentes. El comienzo de una nueva era en las ciudades, marcado sobre todo por el próximo fin de los combustibles fósiles y de recursos naturales finitos, apunta a la necesidad de renovar el concepto de sustentabilidad para preparar a las urbes para una nueva etapa histórica.

Palabras clave: sustentabilidad, Antropoceno, ciudad industrial, ciudad post-carbono

Key words: sustainability, the anthropocene, industrial city, post-carbono city.

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Introduction_

With the prediction of the United Nations that 60% of the world population will live in cities towards the year 2030, urbanization becomes evident as the immediate global future (Gunder, 2006). To re-build settlements in the world, cities and populations ecologically, economically and socially sustainable are the most urgent challenge for the humanity for the 21th century. Within this field, the concept of sustainability is very open and complex, there is not one definition. Because of its openness sustainability sometimes becomes a misused or overused notion. It is used as a "master-signifier" for usual things (Davidson, 2010). In this case it does not easily lead to changes, sustainability becomes ornamental and the sense of urgency is denied. Openness also leads to a diversity of perspectives, which, in their implementation and operationalization only focus on one single issue, for instance energy or water.

In the debate on sustainability different positions can be distinguished (Zumelzu, 2011). One of these angles has come to focus on global warming as the key issue, specifically on the human interference in the global environment. From this point of view, in the past decade sustainability emerged as the key word in urban and societal context. The rise of sustainability can be seen as a reaction to emergent concerns – such as climate change, the peak oil, fossil fuel period- and institutional necessity in an era where authority has been recast. Sustainability emerges as a global problem, because of the imminent "collapse" of our civilization and cities as consequence of the human actions along of the history. In short, the main problem is that the Earth is being changed as a consequence of rising global temperatures resulting from human activity. This problem about to the collapse of our cities is because of our societies have marked, over the last years, an epoch of high consumptions.

The Anthropocene: a geological period of the city_

The human imprint on the environment has become so active that it rivals some of the great forces of nature in its impact on the functioning of the earth system. The late nineteenth Century, scientists were becoming aware of the extent of human influence on planet earth. From that time on, people have been modifying the earth. Changes of the Earth's climate, oceans, land and biosphere are now great and so rapid that the concept of a new geological epoch defined by the action of humans is widely debated.

This concept is called "the anthropocene": referred to the geological episode in the earth history caused by the action of humans (Hodson and Marvin, 2010; Steffen et al, 2011; Tickel, 2011; Zalasiewicz et al, 2011). This phenomenon is now arguably as one of the most important question of our age, not only for scientific, social and politic perspectives, but also for the urban designers and planners in relation to the imminent collapse of our cities and civilization. The Anthropocene is treated as a geological phenomenon, comparable to some of the great events of the Earth's deep past. The origins of the Anthropocene has no precise start date, but may be considered to start around AD 1800s with the beginning of the Industrial Revolution (Steffen et al, 2011). However two pre-industrial events have been cited as advertising the beginning of the Anthropocene. The last period of time, the Quaternary, includes two geological epochs: the Pleistocene and the Holocene. Our interest is focused to the Holocene –period located 10,000 years to present– in which the evidence of human activities becomes more widespread, with the rise of agriculture and the clearance of forests. These both activities have begun to elevate the emissions of CO_2 levels in the atmosphere long before the Industrial Revolution (Zalasiewicz et al, 2011).

The Anthropocene proposes that earth is now moving out of its current geological epoch –the Holocene– and human activity is largely responsible for this exit from the Holocene, in which humankind has become an own global geological force. The beginning of Industrial Revolution around 1800s provides a logical start date for the Anthropocene, which marked the end of agriculture as the most dominant human activity and starting with the "carbon era", generating the rapid transformation of the habitats.

Anthropocene in the cities_

For many authors, this period –the Anthropocene- coincides with the development of industrialization and the global growth in urbanization. The Industrial Revolution brought about a tendency characterised by the predominance of man over nature, which was translated into privileging production over environment detriment. Although the imprint of human activity on the global environment was clearly discernible beyond the pattern of Holocene, the rate at which that imprint was growing increased sharply at mid-century.

W. Steffen refers to this period as "the great acceleration", in which the change of human activities on the global environment was dramatic since 1945 until 2000 (Steffen et al, 2011). During this period, the most dramatic trends have been the widespread abandonment of the farm and village for a life in the city. This migration to cities generally brings with it rising expectations and eventually rising incomes which in turn brings an increase in consumption, especially after the second world war not only with the rise of fossil fuels consumption, but also with the rapid expansion of electronic communication, new technologies, economic connectivity, international travel, and the explosion of mobility. Today cities are growing rapidly, in which urbanization is a direct result of population explosion. Now, there are many cities with between 10 and 20 million inhabitants and urbanization is out of control, at the same time with the levels of consumption (UN-Habitat, 2009). Thus, that population growth is linked with the Industrial Revolution, in which many industrialized systems have ecological effects that are beginning to change the global ecological context within which cities attempt to ensure their continued reproduction.

During the "great acceleration", environmental problems received little attention until 1990s, when the climate was indeed warming and the human activities were the main cause until 2001. From this time on, humanity is entering stage three of the Anthropocene based on the growing awareness of human impact on the environment at the global scale and the first attempts to build global governance systems to manage humanity's relationship with the earth system. During the last few years, human impact on the environment has begun to appear in debates on sustainability and the shaping of a post carbon future (Bridge, 2010, Popper and Popper, 2010).

M. Hodson and S. Marvin in their work urbanism in the Anthropocene pay attention to understand whether some consequences of the Anthropocene –such as climate change– constraint lead to particular types of urban responses and to what extent these responses imply quite different conceptions of the future of cities (Hodson and Marvin, 2010). Their work mention that cities are developing more strategic approaches to meet future resource requirements and to provide conditions that can assure their continuing social, economic and ecological reproduction. The appearance of "new styles" of development and many different types of urbanism can be recognized as responses to ecological pressures such as eco-cities, eco-towns, eco-villages, eco-states, and floating cities, in which these types of responses emerge as an attempt to promote the construction of an ecological secure in respond to the pressures of the Anthropocene.

The conclusion is that our current civilization has attempted to envisage alternatives that might be seeds of the reconstruction of a civilization viable within the resource and environmental constraints that can be expected to prevail.

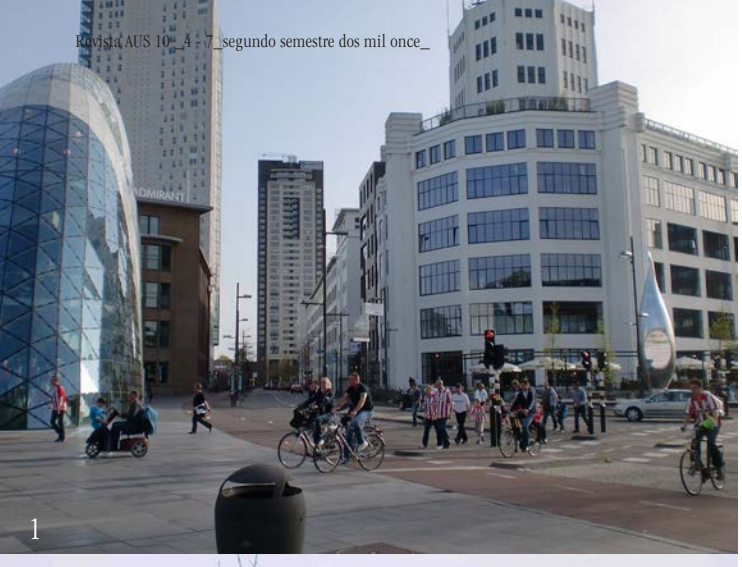
Cities are now the most visible expression of human influence on the planet, being the material representation of energy-intensive economies, in which energy systems –based in carbon for example– have made possible the huge agglomerations of cities and modern industrial systems. The Anthropocene is when the notion of human progress in the natural world is directly challenged, in which the growth of cities is therefore a characteristic feature of the Anthropocene (Steffen et al, 2011; Zalasiewicz et al, 2011). In other words, the industrial city is part of the Anthropocene period.

The case study of Eindhoven in the Netherlands, as an example of Anthropocene city_

Industrial societies have demonstrated a high dependence on fossil fuels consumption. Even though until the 1950s coal was the main source of energy in Europe, the major changes came between 1950s and 1960s in which auto-mobilization took off and with it substitution in home and industry of oil for coal. In this sense, modernity is clearly associated with the sustained throughput of large amounts of fossil fuel consumptions (Atkinson, 2010). Collapsed societies involve geographic fragmentation into much more locally independent entities with simpler economies and consumption patterns and less sophisticated and less monumental cultural self-expression, less flow of information and less complex structuring of what people do and how they relate to one another. The imminent collapse of our civilization is standing in two key aspects of our civilization that are driving it over the edge: suburban living and the obsession with the automobile (Atkinson, 2007, 2008). Suburban life style and living with cars is the core of modern life representing the "nemesis" of modern civilization, in the way that our society insistently follow out their lifestyle desires and specifically how the car becomes a dimension of their personality that reflects their responsibility away from a sustainable future. The impact of the collapse on the urban settlements has been reflected on the phenomenon of spread city or urban sprawl around the world, in which the extensive landscapes will continue to be occupied by the remains of modernity with periphery urban areas, called suburbia (Frey, 1999). It is expect that much of the urban structure of today all around the world being abandoned or with greatly reduced populations clustering on urban edges or in new peri-urban towns.

In Western Europe, many cities and districts in this industrial era grew at least as rapidly as their present-day, being especially industrial settlements part and the main contributors of the Anthropocene period. As an example of Anthropocene city, it is possible to mention the case of the city of Eindhoven. Eindhoven is an example of industrial city located in the south of the Netherlands, which emerged in the 20th Century because Philips established its business in the city on the so called Strijp area (Doevendans, 2009). Rapidly Eindhoven grew, becoming into a strong industrial location in the south-east Brabant region (Schippers, et al 2007). However, as the most industrial cities, after that explosion Eindhoven has an inappropriate scale and image problems (Zumelzu, 2011).

As such, the city of Eindhoven in the post-war period witnessed a tremendous growth, with 208,000 inhabitants it is the largest city in the south of the Netherlands and the fifth city in the country today. Morphologically the city can be typified as a growing together of several villages: Stratum, Gestel, Strijp, Tongelre and Woensel, being this last area one of the best examples of that period of growth (Image 1, Image 2, Image 3, Image 4). The District of Woensel is an enormous postwar expansion area of Eindhoven largely made since 1960 according to the principles of modern urbanism, being an existing environment with a clear transformation phenomenon by dispersion (Zumelzu, 2011) (Image 5). Woensel has today 101,000 inhabitants being the half of total population of the city, and being one of the largest settlements into the region. Woensel has a great dependence of Eindhoven city center especially with respect to work and employments.



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Images 1 and 2_The city of Eindhoven today, as a post-industrial development; and Vlokhoven, a typical post-war neighborhood developed in Woensel area after 1950 (source: author).

Images 3 and 4_Local amenities at neighborhood level located at the post-war urban quarter Tempel; and the district center of Woensel (source: author).

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The district is almost entirely a residential area with services and facilities for the community such as schools, parks, churches, shops, post offices, trade facilities, hospital, among others. Woensel has its own district center, providing for the upper district facilities. Also, it offers few places of local interest, being almost entirely a residential area hardly with mixed-use development, which just eleven urban quarters within the district have a good base of population to support the development of local amenities (Zumelzu, 2011). Eindhoven's main entertainment venues and industry are in other parts of the city (Image 6). The example of Eindhoven, specifically the Woensel area, is part of the debate of the Anthropocene and the post-carbon period: how to make the city survive as a post-industrial city? Eindhoven is a city in Western Europe with a clear transformation phenomenon by dispersion, that has followed a car-dominant model of urban and suburban development, planned according the principles of modern urbanism. This model of urban and suburban development is not sustainable (Frey, 1999; Atkinson, 2008; Karlenzig, 2010). Recognizing the limitations of this "outmoded" model is the first step in planning for our future of economic, social, and environmental uncertainty.

Conclusions and discussion_

With the Anthropocene now as an almost universally recognized challenge, it is necessary that multiple and concurrent steps need to be taken to prepare our cities, towns, and suburbs for the future post-carbon. Industrial city and modern urbanism are part of the Anthropocene period. The city has become a "world object" in the Anthropocene, in an artifact that has the power to intervene globally (Hénaff and Feenberg, 1997). Warren Karlenzig describes the necessity of a vision "towards a more resilient planning" for the future of the cities. He suggests that in this world that has moved rapidly toward an urban existence, we must immediately transform the way we plan and build our cities and suburbs so that resilience is an integral part of every community's design (Karlenzig, 2010). In other words, the post-carbon period marks the end of the carbon period, the end of Anthropocene period, as also the end of modern urbanism, in which the challenge is to leave modern era, to leave the Anthropocene and to start to redesign the time and the space of the city. The perspective of "the catastrophe" within the sustainability debate may be taken as point of departure, in relation to the imminent end of our civilization focused on climate change, the end of fossil fuels and the end of Anthropocene. In this approach, sustainability means "we have to prepare for the post carbon period. In urbanism this means: we have to prepare for the post carbon city (Zumelzu, 2011). Besides, the catastrophic perspective could be an obvious strategy for architects, planners, and urban designers because it requires a thorough design of the city, especially the city of the post carbon period. The suggestion is that in preparing for the next episode of the city the task is not planning and designing new towns and cities but, rather, re-planning and redesigning existing cities, towns and settlements to make them more sustainable.

Image 5_The spatial development of Eindhoven in 1950 inside of today's city boundaries (source: author elaboration).

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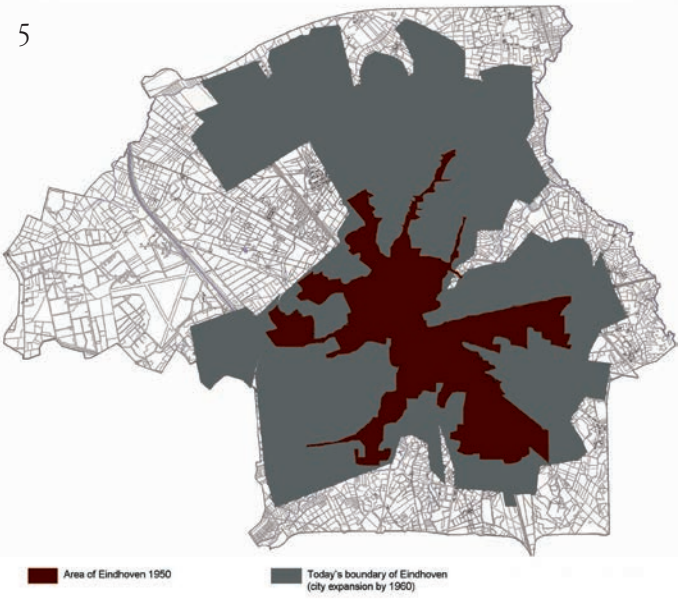

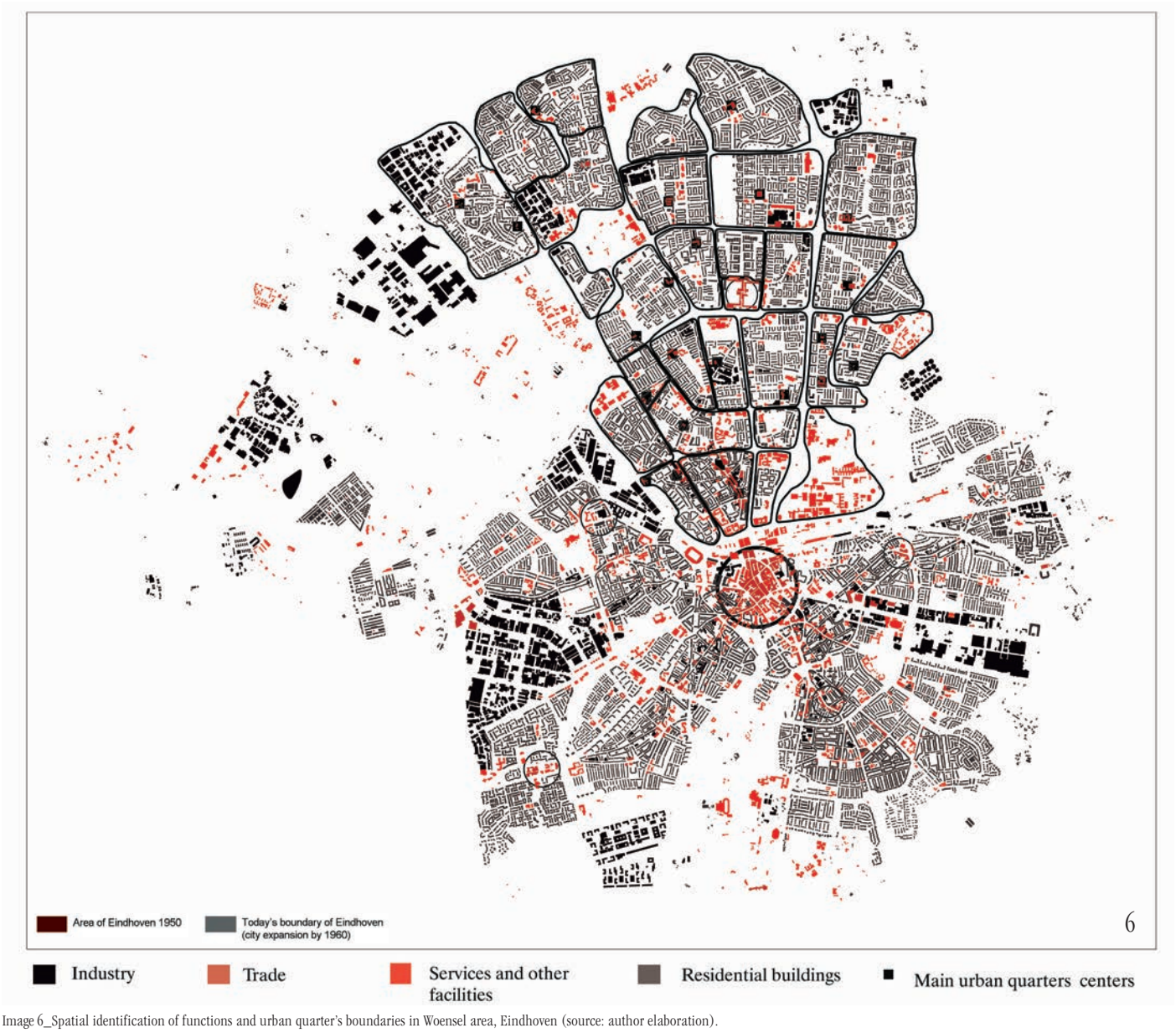

Image 6_Spatial identification of functions and urban quarter's boundaries in Woensel area, Eindhoven (source: author elaboration).

The challenge is to redesign the existing urban form. The recommendation is that discussions of sustainable urban form need to follow a more heuristic trajectory, addressing towards methods rather than producing one-rule models, one-liners or optimal solutions. The development of new methods for redesign the existing cities are necessary.

The beginning of a new episode of the city, marked mainly by the imminent end of the fossil fuels and finites natural resources, proposes that it is necessary to renew the concepts of sustainability in the city, for preparing for the new period of the city in the history; and then to provide new solutions to particular emergent problems of our cities as a consequence to the interference of the human activity on the global environment along the history. aus

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