

Tale of two cities: urban planning for the 21st century eco-metropolis

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Abstract

During the first decade of the 21st century, urban planners have introduced new concepts and strategies to design sustainable cities. By the end of that decade, the idea of eco-cities has become a reality and a goal that many European capitals have reached or are about to reach. In contrast with classical urban planning methods, town planning has nowadays focused on sustainability, improvement of life quality and social aspects. The planning of the town focuses more on the user and the sense of community. Large-scale strategies are nowadays combined with human scale and adaptability. The improvement of live quality has to deal now with concepts as low air pollution levels, green areas, good public transport networks, bike-friendly cities and outdoors sports among others. Two representative case studies of these new urban planning principles are the cities of London and Copenhagen. On the first case, the largest European city has suffered a huge transformation to adapt itself to the Olympic Games. On the second case, a small capital with rather more than one million inhabitants is on its way to achieve the title of the most sustainable city in Europe. In the two cases, town-planning strategies have been diverse but the core of both remains sustainability. This paper aims to analyse these two cases comparing their different contexts with the concept of eco-city as a common background. Our main goal is to study contemporary urban planning and identify transformation processes of cities nowadays. The influence of the recession environment in which Western countries are currently immerse has conditioned as well many decisions that involve citizens, public administration, real state investors and urban planners on the same level.

Keywords: urban planning, sustainable development, London, Copenhagen, eco-city, town planning.



1 Historical perspectives and current context

Efforts to render cities environmentally and socially sustainable are not new. Urban planning and regeneration over the last century have been influenced by attempts to balance the effects of large-scale urbanisation, such as environmental degradation, social differences and urban sprawl. The Garden City, New Town and Techno-City are 19th century examples of city reinvention in the post-industrial era [1]. The term eco-city was introduced in the 1980s when the environmental movement by Richard Register settled the “Urban Ecology initiative” leading to the first international eco-city conference in 1990, a collection of proposals on urban planning, transportation, housing, economics and development with a few practical examples. It was after the 1992 United Nations Earth Summit in Rio de Janeiro and its sustainable development program, Agenda 21, when eco-city concepts started to be translated into practice.

In the early 2000s geographic spread and international globalisation led to policy uptakes and practical implementations of the eco-city phenomenon [1]. These initiatives rapidly increased thanks to policy implementations like, for instance, the European Commission’s “Eco-City Project” and the World Economic Forum’s “Slim City”.

2 Characterization and definition of an eco-metropolis

In 2011, there were 178 sustainable development initiatives that represented a significant mainstreaming of urban sustainability. In addition, assessment procedures for the evaluation of sustainability levels of architecture and urban plans have recently begun to emerge. The definition of eco-city indicators and the establishment of standards became complex as the number of eco-initiatives increased. Concepts like “low-carbon city”, “solar city”, “smart city” and “sustainable city” have augmented while the current context of urban sustainability is involving international, national and local governmental, non-governmental and private actors operating through public, private and mixed partnerships [2]. The most basic indicators specify in which terms urban sustainability affects to a certain community and its elements and goals are defined from the environmental, economic and social sustainable development in relation to urban settings. These indicators can be used for monitoring and assessing improvements and deteriorations for certain aspects of sustainability. In the case of Copenhagen 2015, an indicator of sustainable life quality can be defined in terms of access to parks that will correspond to the 90% of Copenhageners being able to walk to a park, a beach or a sea swimming pool in less than 15 minutes [3]. In the case of London 2012, an indicator of sustainable social development is the Olympic and Paralympic village consisting of 2018 apartments in 11 plots that will be converted into a residential community, contributing to the regeneration of the Stratford area of London.

The definition of urban sustainability indicators comes from technical analyses, national and local policies and specific urban conditions with variations



due to stakeholder involvement [4]. Considering the project for London 2012, local policies had to face the effect of the Global Financial Crisis in 2008, which lead to specific implications for design and procurement [5].

The development and application of urban sustainability indicators should be considered in technical and governance terms being applied in policy-making and as part of a social process. From this perspective, indicators can be understood as strategic instruments to influence policy and taken as tools for social learning. Under governance, indicators are an institutional process to define policy, generate knowledge and apply them in practice [6].

3 Framework for London 2012 and Copenhagen 2015

The methods of measuring urban sustainability vary with the context, with no recognised overarching framework and a lack of standardization. This way, eco-city frameworks and their governances are outlined by: work strategy, performance assessment, and social learning [4]. If we compare the framework of *London's Olympic and Paralympics Games 2012* and *Copenhagen 2015*, their main sustainability indicators can be analyzed as listed in figure 1.

<p>Copenhagen (DK) Eco-metropolis 2015; individual eco-city initiative (retrofit); <u>Key elements:</u> - 4 categories (cycling, climate change, leisure, health) - total of 10 indicators across 4 categories (2015 targets) - goal of involving citizens and business community <u>Key functions:</u> - A: distinctive local definition for competitive advantage - B: clear performance measurement - C: social learning through active community involvement</p> <p>London (UK) Olympic and Paralympic Games 2012; individual eco-city initiatives (infill & new build); <u>Key elements:</u> - urban improvements focused on the Trafford area - improvement of existing green areas and new green belt (park) - high sustainability requirements for the architecture: temporary buildings, recyclable materials and elements, legacy <u>Key functions:</u> - A: sustainable urban improvements & high energy efficient temporary & new architecture - B: clear performance and assessment by the ODA - C: social learning through active community involvement in the whole London Greater Area-</p> <p>A = work strategy; B = performance assessment; C = social learning.</p>
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Figure 1: Sustainability indicators for London 2012 and Copenhagen 2015: from reference [2].

4 Sustainable urban strategy for London 2012 Olympic and Paralympic summer games

London has been the first city to host the Summer Olympic Games for the third time in modern history. The organising committee showed their capability to arrange the event and great commitment with technical innovation, sustainability

efficiency and social involvement. High quality architecture was combined with urban planning for the event and the future of the city. The temporality of some buildings of the Olympic Park and Village met the adaptability of other venues in a sustainable system of urban planning, transportation and architecture [7].

The Olympics have traditionally been a catalyst to renovate the infrastructures of hosting cities. Beijing 2008 and Athens 2004 focused on reducing air pollution whereas the Sydney Olympics 2000 were the *Green Games*. In London 2012, the Organizing Committee aimed to make the Games environmentally friendly. Barcelona 1992 and Tokyo 1964 used the Olympics as an asset for urban regeneration: while Tokyo reintroduced the city to the world after the II World War, Barcelona used the Games to develop major infrastructure regeneration bringing to the city international recognition and becoming a model for urban planning thanks to the Games. The city of London and the Organizing Committee took a similar approach by using the 2012 Olympics to improve the eastern boroughs of London Greater Area [7]. As common background for all Olympic cities, a new stadium had to be specially constructed and almost every host city has had to either improve an airport, or build a new one. In the case of London, Heathrow was already an international airport capable of handling the increased load of passengers only building the new Terminal 5 as a requirement [7].

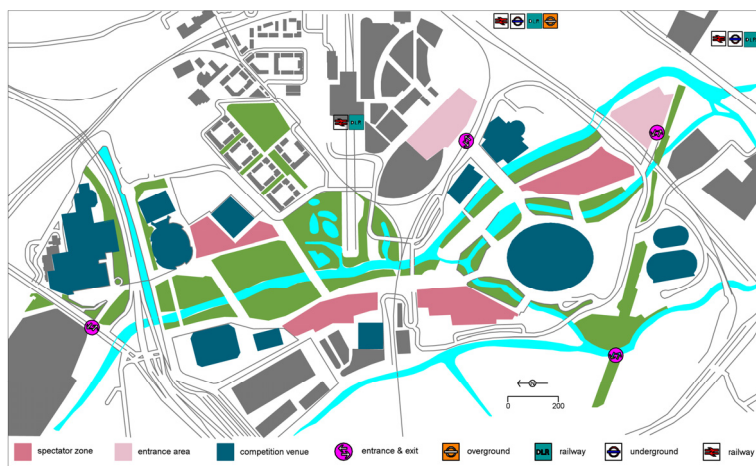


Figure 2: Olympic games Venues, London 2012 [8].

For the *Olympic and Paralympic Summer Games 2012*, 15 of the 33 competition venues already existed and the large majority of events were held in the Olympic Park, the Central Cluster, and the River Cluster (figure 2). The Olympic Park was the most popular area holding venues for 13 sporting events. The Olympic Village provided beds to over 17,000 persons in 4,200 residential buildings [7].

Previous to the Olympics, the city of London improved a large number of infrastructure, sporting arenas and facilities. For instance, the London

Underground renovated lines to ensure safety and efficiency since 33% of spectators were expected to come from the Greater London into the Inner City. Transportation by road was also improved with the Olympic Route Network (ORN) around London [9].

Greenwich, Hackney, Newham, Tower Hamlets, and Waltham Forest were the boroughs hosting venues for London 2012. The Olympic Delivery Authority (ODA) oversaw the implemented infrastructure in each borough being responsible for venue construction and new roads to support the influx of people during the Games [9]. Many of the boroughs concentrated on the implementation of a residents' employment program in the construction and the running of the Games as a catalyst for poverty-stricken neighbourhood development [7].

5 Sustainable architecture strategy for London 2012

The Olympic Delivery Authority applied a sustainability strategy for the architecture and urban planning of London 2012 in many levels. The built environment comprehended the built-up areas and gardens in the UKBAP. That way, buildings were designed as wildlife habitats with green roofs, living walls and nesting and roosting boxes integrated in the structures [10]. On the same way, parks, squares and amenity spaces were an essential component of the master plan. In order to promote biodiversity in the Olympic Park, planted trees were predominantly native, amenity grasslands were established as species and rich lawns and ornamental planting included wildlife attractive species. A preliminary target for 1.67 ha of habitat was to be created by 2014 with some areas already established by 2012.

To match the strong environmental requirements that ODA fixed for London's 2012 venues the key sustainability criteria of reducing, reusing and recycling were adopted by *Populous Architecture* to create a compact, flexible and light-weight design of the Olympic Stadium to be transformed after the Games from 80,000 capacity venue to a minimum of 25,000 seat venue form.

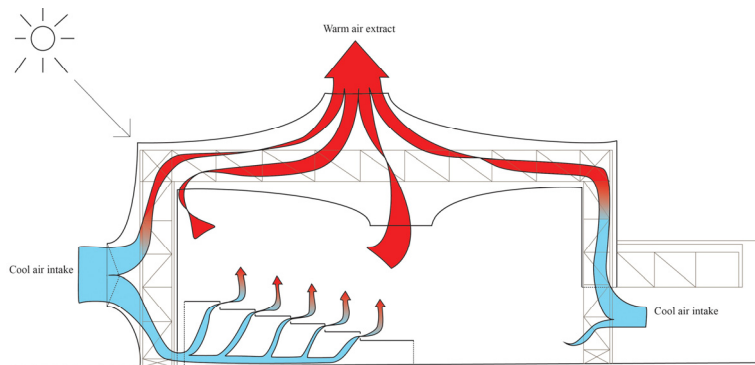


Figure 3: Cross section of the Shooting Venue. Olympic Games London 2012 [11].

Sustainability was also the key driver in the design of the Basketball Arena by *Wilkinson Eyre*, one of the biggest temporary venues ever created for any Olympic and Paralympic Games [11].

The arena was made out of robust individual components that can be easily dismantled and subdivided for re-use with over two-thirds of the materials and components identified for recycle. In the case of the Velodrome, ODA set a member of challenging sustainability targets for the project by *Hopkins Architects* focusing on the minimization of the energy and water demand and the integration of this into the fabric of the building to reduce reliance on systems and infrastructure as shown on the use of maximum daylight: a much more efficient solution to reduce carbon emissions. Moreover, sustainability was a main feature in *Magma Architecture's* shooting venue at the Royal Artillery Barracks. All three removable ranges were configured in a crisp, white double curved membrane facade studded with vibrantly coloured openings. All three of the venues were fully mobile and all their components could be easily reassembled. No composite materials or adhesives were used. The need for artificial lighting was reduced thanks to the semi-transparent facades and the ventilation was fully natural (figure 3) [11].

An efficient design solution for the Olympic and Paralympic Village was a challenge for the design team -*Robert Bird Group*- to enable configuration for an immediate use and its subsequent further adaptation into a total of 1350 private and social housing units. The planning approach was based upon the "Maida Vale" model found in parts of North London where the interiors of blocks are given over to gardens shared by residents. The residential apartment buildings consisting of three floors of maisonettes were combined with duplex family maisonette units due to market decisions. As a result, the Olympic Village was the first large-scale residential scheme to be designed to Code for Sustainable Homes Level 4 containing: energy and CO₂ emissions, water, materials, surface water run-off, waste, pollution, health and well-being, management and ecology. In addition, ODA included as a sustainable criteria: 20% of materials (by value) to have recycled content; 25% of aggregates (by weight) to be from recycled or secondary sources; 0% of Prohibited and Referable Materials; Global Warming Potential (GWP) of all insulation to be less than 5 and responsible sourcing of materials [11].

The Biodiversity Action Plan (BAP) designed for London 2012 was a challenge for the Olympic Park, becoming an asset for London and the catalyst for large-scale regeneration of one of the most deprived areas in the UK. The Games were a short-lived event but the area continued to develop thereafter into a significant sporting, social, economic, cultural and environmental hub for local, metropolitan, national and international visitors. The Olympic Park was also part of a wider vision to create an extended network of interconnected green spaces (green infrastructure) [10]. Legacy conditions were considered as part of the London Development Agency's (LDA's) Legacy Masterplan Framework (LMF) study. The Olympic Park BAP required a Biodiversity Action Plan for the Olympic construction, games and legacy transformations. The plan established targets and provided guidance on how to enhance biodiversity through the

Olympics to the Legacy Transformation phase in 2014; underpinning in the construction phase by the Ecological Management Plan to protect existing habitats and species and to improve access to nature. The BAP will bring local people an opportunity to be involved in nature conservation providing guidance to enable the designers, builders and operators of the Olympic Park to maintain and enhance biodiversity [10]. The BAP was one of the documents produced by the ODA that also included the Urban Design and Landscape Framework (UDLF), the *Waterspace Masterplan* and Lightning Strategy. These documents, in combination with the emerging Parklands and Public Realm design, will provide a framework for the whole package. Key stakeholders were consulted as part of the design process to develop and implement the BAP. The range of habitats included reflected the biodiversity of the site before construction began but also the desire to restore the vegetation that had disappeared from the area and the waterways. In view of this, the ODA adopted an overall target to create, by 2014, at least 45 ha of a new habitat which will eventually mature to meet a quality standard of Site of Borough Importance (SBI) Grade 1 or better [10].

6 Copenhagen's ambitious goal

Copenhagen is an important European capital and the largest Scandinavian city. But, while visiting Copenhagen the chaos of a "Capital City" does not surround visitors. Instead, the first things to be noticed are the calmed and relaxed atmosphere, the nearness to forests and sea and the ring of bicycle bells passing by. Perhaps these are the factors that make Copenhageners some of the happiest and healthiest citizens in the world. Even though, the city of Copenhagen will be setting new standard for, the healthy and clean cities of the future.

City officials have decided to make Copenhagen a better place to live by creating the first carbon neutral capital in the world by 2025, and the first step to achieve this goal is to reduce the CO₂ Emissions by 20% between the years 2005 to 2015 [12]. This ambitious goal will make Copenhagen a more pleasant city to live and it will also create new 21st century green jobs introducing Copenhagen as a centre for future sustainable research and development in the international community.

7 Urban strategy

In order to achieve these ambitious goals (e.g. Copenhagen's First Carbon Neutral Capital in the world) an intelligent urban planning to allow the city expand in size and population for a cleaner and a healthier future is required. Copenhagen has always inspired other cities to create a healthier environment, going from the famous blue bicycle lanes to its energy production or the improvement of recreational areas, pedestrian streets and a more active and vibrant social environment for the citizens.

During the modernist movement of the 1960s, the urban planning was focused on automobiles. Tall residential buildings, with vast empty spaces in between them where constructed in the suburbs of many major cities around the



world, being connected to the city centres by large motorways. However, that plan not only demonstrated to be harmful towards the environment and the health of the citizens, but it also established huge flaws in an urban context. The large empty spaces and the distances between the buildings created a lifeless environment.

In 1968 School of Architecture at the Royal Danish Academy of Fine arts, started the research about Public Space, Public Life and Pedestrian Flow in the city of Copenhagen [14], initiating a series of methods and strategies to create a more pedestrian and bicycle friendly environment. This way, Danish urban designers proposed an urban environment to prioritize people needs “making places better for people” [14] (figure 4).



Figure 4: Development of Copenhagen’s Pedestrian area from 1962 to 2005 [14].

According to Jan Gehl, “people don’t change their behaviour when you tell them to, but when the context compels them” [14]. So with the right urban planning and strategies, the city officials can provide an opportunity for the citizens to become involved in improving the living conditions within the community.

On the contrary, more roads do not always translate into less traffic. With a smart planning, the city can provide an active modern neighbourhood with less car traffic because the users can adapt to the new traffic system removing car usage priority [15]. Copenhagen has been providing better and safer atmosphere for pedestrians and cyclists thanks to a human scale design, the increase of urban life, social activities and human interaction integrated into the urban fabric of the city. In order to encourage people to engage in various urban activities, public spaces must provide protection, security, reasonable space, urban furniture and visual quality.

During the 90s, Copenhagen started converting many of its open-air parking lots, into enjoyable public areas. This transition created good business environment a more active life style for Copenhageners and gave rebirth to derelict historical areas. Well-designed urban spaces will encourage more people to walk and more visitors will attract more people; but new public spaces are not the only strategy to help Copenhagen to achieve its goal. The city has initiated an urban scheme called “Green and Blue Capital City” to provide clean parks and beaches for the great majority of Copenhageners, by the year 2015. This fact will attract more visitors and will provide an environment of peace and relaxation as well as a chance for physical activity for the citizens. Today 60% of Copenhageners are living within 15 minutes walking distance of a green or blue

area. Moreover, Copenhagen city officials have decided to provide 90% of their citizens with a 15 minutes walking distance to a green or blue area by the year 2015. In the words of Jan Gehl, a city planning should consider “Life, Space, Building – in that order” [15].

8 Transportation

Copenhagen has developed a safe and comfortable well-designed network of bicycle lanes. Today, around 35% of commuters cycle to work or education centres with the aim of a further increase of this number to 50% by the year 2015 [13]. Copenhagen’s extensive bicycle lanes have created a more human friendly urban environment, a more liveable city, less traffic congestions, lower noise and air-pollution and a reduction in carbon emissions. In addition, studies have shown that for every kilometre travelled by bicycle instead of a car the society gains 0.16€, and the cyclist’s healthcare cost is reduced by 0.77€[13]. Today the city is improving the cycling conditions for Copenhageners increasing the amount of pedestrian and bicycle bridges across the city. Moreover, once the “Bicycle Super Highways” are constructed, direct bicycle connection to the city centre from the suburbs will be possible.

To achieve the transportation demands of a modern capital city, Copenhagen has been vastly investing in its public transportation system. Statistics show that the improvements in the public transportation system have decreased the number of cars trips in the city centre from 351,000 trips in 1970 to 284,900 car trips in 2010. These improvements include the expansion of the underground network, travel cards for train, metro and bus; real time bus stop information system; online journey planner, smart phones ticket selling applications, a bike-friendly public transportation system, electric cars charging facilities and car-sharing policies.

9 Sustainable energy

Currently 22% of Denmark’s electricity is produced by wind energy. To reduce carbon emissions and to create new high skilled green jobs this number is expected to reach 50% by the year 2020 [13].

Moreover, Copenhagen has one of the most efficient waste management systems sending 2% of its waste to landfill (this figure was 40% back in 1988). Properly filtered waste-energy power plants meet the high Danish emission regulations while providing the city heat and electricity. In addition, 98% of household in Copenhagen are connected to the “District Heating System” that produces energy reusing the surplus heat for heating the households avoiding sea ejection.

The city of Copenhagen is planning to meet 75% of its CO₂ reduction goals by the year 2015 through upgrading its energy supply [12]. Moreover, the city is determined to help citizens to save more energy through better education, more public awareness and tougher building codes. All these would mean, less carbon



emissions, less dependence on fossil fuel, less energy consumption and a much more stable economy.

10 Copenhagen 2025

The city of the future is no longer about demonstrating economic power through skyscrapers and bigger highways, but it is about creating a better, welcoming and a vibrant urban environment for all with healthier environment policies. Statistics are showing how Copenhagen has been able to reduce its CO₂ emissions by more than 20% from 2005 to 2011 [13]. City's three main strategies for accomplishing its goal are:

- Implementation of smart urban policies to improve pedestrian-friendly environment that will generate better public spaces and healthier outdoor activities for the citizens.
- Development of a more efficient transportation system
- Increase of sustainable energy production with lower energy consumption.

By achieving its goal, Copenhagen will become an important research hub for international green clean-tech companies. With its current district heating system and the existing extensive bicycle lanes, Copenhagen is already a step closer towards its target. Moreover, one of the city's most valuable assets in this case is the extremely environmentally conscious public opinion, a motivating factor for Copenhagen to become the first carbon neutral capital in the world by the year 2025.

11 Conclusion

What this paper has presented are two strategies of sustainable development and town planning improvements in the 21st Century. The first significant difference is the scale of the two case studies: Greater London has a density of population of 5,200/km² on an area of 1570 km² of which only 2.5 km² were part of the development plan whereas Copenhagen's population is over one million people settled on 445 km² with a metropolitan area of 3030 km². On the first case, the city of London and the Greater Area have taken the Olympic Games as a chance to improve the existing infrastructures mainly focusing on sustainable innovative architecture. On the second case, Copenhagen 2015 consists of a whole urban plan for a city that already has good infrastructures for a sustainable growth. In both cases public awareness and politics conditioned the planning from diverse points of view but at the same time many common policies and urban development practices were applied. In the case of Copenhagen, sustainability is a basic right and a concern for citizens and government instead of an asset for economical development thanks to an international event. These facts condition the strategy and its consequences: the city of Copenhagen required a global urban planning strategy and the city of London developed punctual urban improvements with repercussions for the city itself and the greater area focusing on the efficiency of the new architecture introduced in the urban grid. This way,



Copenhagen's planning was based on self-commitment and London actions had a primary goal with secondary consequences considered as a legacy. In both cases, common goals as low carbon emissions, improvement of public transport, an accessible city, bike and pedestrian-friendly town, accessible green areas and life quality improvement are present.

The improvement process of Copenhagen seems to be a natural evolution of a group of existing factors whereas London had to adjust the specific improvements to the city with further sustainable goals as a legacy of the event. This shows how a city had to adapt itself to a large-scale short-term event instead of having a natural improvement through urban planning. The development of London had to fit in the requirements of the Olympics while Copenhagen's is the consequence of a constant town renovation. Any of the cases included urban sprawl. Furthermore, London integrated new architecture relatively close to the centre of the city to develop derelict areas with industrial backgrounds and social needs. Many of the new buildings were temporary being unassembled after the Games to give those spaces back to the city. Green areas to be enjoyed and reached by everybody were basic on both planning strategies, a constant on European urban planning nowadays.

The scale of each city has set different standards to achieve their sustainable goals. On each case the aims are significant and vital to provide a better standard of living for their citizens, and to improve their international image. London showed how a mega-polis can host a gigantic international event while keeping sustainable planning in mind, whereas Copenhagen wanted to improve the negative outcome of the United Nations Climate Change Conference COP15 by aiming to become the first carbon neutral capital in the world and to make Copenhagen a leader in green and sustainable growth.

From the management point of view, Copenhagen has been commissioned and managed by the city town hall whereas the Olympic Delivery Authority (ODA) commissioned and managed London's urban plan for the Games. This difference conditioned the speed of the improvements and the decisions taken. Copenhagen is implementing policies that imply long-term actions and on-going processes and London had to reach a struggling deadline on a first phase that will be continued through two further phases. These frameworks had effects on the development of the planning and conditioned the adaptation of the citizens to the transformation. In the case of London, the goal was the legacy that the Games could leave to the citizens and for Copenhagen the strategy is based on how to improve a city for its own citizens.

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