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Urban regeneration development policies of post industrial cities - Comparison study between Turin, Italy and Łódź, Poland/

Revitalization policies and challenges due to Climate Change and Covid-19 pandemic/

Master degree thesis in Archtecture for the Sustainability Design

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URBAN REGENERATION DEVELOPMENT POLICIES OF
POST INDUSTRIAL CITIES-
COMPARISON STUDY BETWEEN TURIN, ITALY AND
ŁÓDŹ, POLAND
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ABSTRACT

According to United Nations forecasts, cities occupy about 3% of the earth's surface and are responsible for more than 70% of the greenhouse gas emissions and use ¾ of global energy. By 2050 almost 85% of the European population is expected to move to According to United Nations forecasts, cities occupy about 3% of the earth's surface and are responsible for more than 70% of the greenhouse gas emissions and use ¾ of global energy. These initial data allow us to understand the close relationship between climate change prevention and cities. Furthermore , the recent events of the last three years have brought more to light the challenges that cities must face. Covid-19 pandemic has impacted our lives and the city's priority development plans significantly. The spread of the virus caused many sudden changes in the city's dynamics. Cities had to shut down all public facilities due to the global quarantine. The Covid-19 pandemic shaped the visions of future cities and clarified their principal needs. This study aims to examine how climate change and Covid-19 issues affect and change our cities and how urban planning policies can deal with the resulting problems. This question is addressed by examining in detail the urban regeneration policies in the reuse of existing post-industrial sites - or brownfield sites - , focusing mainly on the two cities of Łódź, Poland and Turin, Italy. Most of the city's brownfields were abandoned and ,after deindustrialization, some of them were restored and reused while others were still left as brownfields. These are often large sites, mostly intra-urban areas which are easily accessible by any means of transport. The above characteristics are such as to ensure that the urban regeneration plans of these urban areas constitute a significant reference for urban policies attentive to the problems resulting from climate change and emerging from the pandemic period.

Key words: *Industrial, Deindustrailization, Post-industrial, Brownfields, Redevelopment, Climate Change, Covid-19*

1

INTRODUCTION AND GENERAL CONTEXT OF THE STUDY

1.1 Introduction and structure of the thesis

"Deindustrialization, the economic crisis, the demographic decline and other minor processes have led to the abandonment of more or less large areas located within the urban environment. As a consequence of the abandonment process, these places are more or less large areas located within the urban environment. As a consequence of the abandonment process, these places are perceived by the community as a source of decay and danger. In fact, the potential of brownfield sites is considerable. They have a privileged location since they are mostly empty urban areas that are easily reachable and connected to the main transport infrastructures, especially sites with previous industrial use; they are already served by the primary urbanization works; they constitute urbanized territory, therefore their transformation does not involve further land consumption but, at the most, a saving of the same."[1]

Most of the European cities are rich in industrial heritage and for this study the two cities were chosen: Łódź in Poland and Turin in Italy. The size of the two cities is rather similar, where the city of Łódź has an area of 293.25 km2 with population of 672.185 and Turin metropolitan area has 130.17 km2 and population of 847.287. Although both cities had their differences in urban development and history, as in the case of Lodz the industrialization shaped the core and future of the city, it was the main factor that caused the expansion of the city. The city of Łódź was made by factories and industrial districts, the city did not exist before the industrial revolution and the city planning was not controlled. The city structure was made by different urban grids joined together by means of streets. The opposite was in the case of Turin where the city during the industrial revolution had already rich heritage, the beginnings of Turin date back to 218 BC. The city development was more controlled and followed the already existing grid of ancient Turin.

Despite those differences between Turin and Lodz the two cities share one main factor which is industrial heritage. Both Łódź and Turin were strongly impacted by their industrial past and faced the same problems with abandoned industrial sites. After deindustrialization Łódź as well as Turin were put through regeneration and transformation processes, redeveloping and reusing the brownfields areas. In spite of that fact the abandoned industrial sites are still present in the urban environment of Łódź and Turin and can have great potential contribution in urban context.

While Łódź and Turin face the same problem of unused abandoned areas in the city they also face other future challenges such as post Covid-19 pandemic influence that changed the way of living in the cities as well as their dynamics. Both cities also face a great crisis in Climate Change and how to address it in future development of the cities.

The main focus of the thesis is to make a comparison study of urban development of two cities: Łódź in Poland and Turin in Italy and how climate change and covid-19 pandemic affected urban planning strategies. Thesis studies in depth the possible policies with which the two cities use brownfield sites for interventions that aim to implement problems of climate change and post Covid-19

[1] Francini M., Margiotta N., Palermo A., Viapiana M.F., (2020) "Per efficienti "infrastrutture sociali": il recupero di siti ed edifici dismessi" in *Riabitare la città dopo l'emergenza, tra distanze e nuove forme di prossimità in Urbanistica informazioni XII Giornata Internazionale di Studio INU Benessere e/o salute? 90 anni di studi, politiche,* Di Biagi Paola, Basso Sara, piani, INU, Roma, 2020, p. 19-23

pandemic. The both issues of Climate Change and Covid-19 pandemic are addressed and summarized in this thesis based on in-depth study and analysis and supported by a significant amount of articles, books and researches.
Climate change and environmental degradation are an existential threat to the world. To achieve the climate-neutral continent by 2050, the European Commission created the European Green Deal to overcome these challenges. The European Green Deal is also a lifeline out of the Covid-19 pandemic.
The Covid-19 pandemic made us rethink the already well known concept of 15-minutes city - it's all about how most of the daily necessities were available on foot or by bicycle around the place of residence. Covid-19 emergency showed us also that most cities lack important public services or these services are inadequate: such as hospitals as well as schools, parks, green areas, sport facilities which are being associated with far greater users than their own abilities and not allowing respect for social distancing.

This thesis study consists of 5 chapters. The first part is reserved for the brief overview of the concept of industrial city, brownfield areas and the deindustrialization process in European cities.

The second and third chapter intend to outline the urban development of both cities of Łódź and Turin that underwent during the industrial revolution and what resulted after deindustrialization focusing on the urban policies for the redevelopment of post-industrial sites.
The second chapter focuses on comparison study of two cities Łódź, Poland and Turin, Italy. This part is mainly focused on urban development of both cities during the industrial revolution, how the industrialization impacted the growth and urbanization in Łódź and Turin.
Chapter three focuses on deindustrialization phenomena in both cities of Łódź and Turin and their processes of regeneration. The Piano Regolatore Generale di Torino (PRG) from 1995 with Spina projects and Winter Olympics Strategic plans are presented for Turin focusing on redevelopment and reuse of former brownfields. For Łódź LPR- Simplified Local Revitalization Program selected downtown post-industrial areas of Łódź for the years 2004–2013 is presented that as well as the municipal revitalization program for the city of Łódź (GPRŁ) and Revitalization Program of Łódź 2026+ that focus on the revitalization of brownfield areas in Łódź.
The fourth chapter brings into attention the future challenges of all European cities addressing the main policies for the climate change crisis such as the The Intergovernmental Panel on Climate Change (IPCC), COP21 and European Green Deal. This part is focused on deep study that concentrates on the sustainable policies regarding redevelopment of brownfield areas and the RESCUE project from 2005 and its main objectives.
This section also presents the main aspects for future urban development ideas that were the product of Covid-19 pandemic, the reflections on influence of Covid-19 crisis, the rediscussion of the 15 minutes concept of Carlos Moreno and its main principles, applications and limits. As one of the other products of Covid-19 pandemic, the short subsection about the readaptation of post-industrial sites into health services is addressed.

Chapter five is mainly focused on present development strategies for Turin and Lodz that address the redevelopment of brownfield areas. In the case of Lodz the development strategy for the city of Łódź 2030+ and Adaptation Plan to the Climate Change of the city of Łódź by 2030 are analyzed. Also the Łódź with an Idea for the Future Report from 2022 is brought to the attention and summarizes all the interventions, including revitalization of post-industrial sites, that are planned for the city of Łódź.
In the case of Turin two direct surveys in terms of interviews were conducted, one in the Città metropolitana di Torino with Architect Paola Boggio Merlo, second in Città di Torino with Architect Emanuela Canevaro. Both interviews were aimed at the issue of redevelopment of brownfield areas, in the metropolitan area of Turin with the TRENTAMETRO project as well as in the city of Turin with its new policies and challenges.

The last chapter is focused on the adaptation of climate change and Covid-19 policies in former industrial sites in Łódź and Turin by presenting examples of reuse and adaptation of former brownfields areas. In this chapter the in-depth study was carried out on the chosen examples of former brownfields and their redevelopment strategies pointing out the two main issues that are addressed in these thesis, Climate Change and Covid-19. The research on those sites focuses on the policies that were or were not adapted to overcome the future challenges. In some cases both Climate change and Covid-19 policies were adapted while others are solving only one or none issues. This chapter also brings to light the future projects that are in ongoing process or yet to be realized that are adapting both policies of Climate Change and Covid-19 pandemic.

In the conclusion two dismissed sites, one in Turin and one in Lodz were chosen for the analysis to examine the possible opportunities as well as negative aspects of both areas in terms of future challenges. This brief study helps to summarize the concept of redevelopment of former brownfields and their possibility to fulfill the challenges of Climate Change and Covid-19 pandemic.

1.2 Industrial city

"The industrial city that emerged in Europe in the 19th century was mostly an environment hostile to humans. Heavily polluted environment nature, the architecture acompanning the view of the city was monotonous with block buildings, technical subordinated public space production caused that after the collapse of traditional industries in many cases there was no city-forming element, the strength guaranteeing the development of the post-industrial city.
In post-industrial cities, there is an oversupply of industrial land, transforming into urban brownfields, counterurbanization and social and spatial degradation of downtown areas." [2]
Industrial cities were often associated with high levels of air or water pollution. "The social structure and class relations of their workplaces are often polarized and this is both reflected and reproduced in a simplified social geography." [1] The first industrial cities appeared in the 19th century in western Europe and North America.

The first industrializing countries - introducing new production techniques, recorded significant changes in labor productivity, contributing to the initiation of the process of changing the structure of expenditure and production in the economy. These changes have led countries to develop ample opportunities for growth and the economic well-being of societies. At the beginning of the nineteenth century, Great Britain's new methods of processing production spread to other countries, strengthening their industrialization processes, bringing with them economic and social consequences.
The Industrial revolution that appeared in the 1760s and was associated with the new production processes in Europe.
The handmade manufacturing of the products was substituted by the production done with machines and use of new technologies such as the usage of the power of steam and water. The Industrial Revolution was a key point in the change in history, it influenced many aspects in the development of European cities such as the average income, population growth and living standards.

Many European cities such as Turin or Łódź experienced great urban development during the industrial era although many industrial districts in both cities were lacking main services in their industrial neighborhoods. The industrial revolution was the main highlight and main identity of many European cities. When deindustrialization occurred it brought considerable crisis in the development of the cities.

"By the outbreak of the post-World War II peace, property-owning farmers were clearly the major saturn." [4]
"The European development out of agriculture was for a long time very uneven. In Europe west of the USSR and north of the Balkans, 137 regions out of 465 still had more than half of their labor force in agriculture in 1950." [5]

Europe was still mostly agrarian society rather than industrial, such as Italy, France or most of Balkan countries. The outbreak started in late 1960's, in Finland and Spain industrial employment overtook the agricultural one which was later on followed by countries like Ireland and Greece. While in most of the countries in east and South Europe resulted in having more employment in agriculture rather than manufacturing which led to re-agrarianization in some countries like Albania, Moldova, Romania and Belarus where the industrial sector fell completely under agricultural one.

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[2] Szymański P., (2004) "R&D w rewitalizacji miast poprzemysłowych" in *Rewitalizacja miast poprzemysłowych - rola dziedzictwa kulturowego*, Łódzka Okręgowa Izba Inżynierów Budownictwa i autorzy, Łódź, p.323-33
[3] Harris R., (2009), "Industrial city" in *International Encyclopedia of Human Geography*, Rob Kitchin and Nigel Thrift editors, p. 383-388
[4,5] Therborn G., (1995), European modernity and beyond : the trajectory of European societies, 1945-2000, Thousand Oaks, Calif. : Sage Publications, London, p. 65-68

"Europe was the only part of the world that took the path from agrarian society to an industrial and then to a service society, defined in terms of the relative dominance of employment shares." [6]

"Industrialization continued in Europe after World War I, and industrial employment culminated in the twelve current EC countries in relative terms in the early, in absolute terms in the late 1960s, at 40-1% of total civilian employment. Eastern Europe underwent a dramatic process of industrialization and became in the end the epitome of industrial society. This may be seen as a typical effect of Communist rule, the positive - i.e. non-repressive aspects of which derived from the classical age of the labor movement, in whose vision industrialization, full employment, basic social security, workers' education and formal equality between men and women were all included." [7]

After World War II Europe experienced its peak in the industrialization sector. In the Estern Europe the pinnacle of the industrialization could be noticed by rapidly rising new, huge industrial cities such as Nowa Huta in southern Poland or Stalinstadt on the east part of Germany. The industrial outburst also occurred in Finland, the Netherlands, Portugal and Spain. In Western Europe the highest peak of industrialization occurred around 1970 which was the biggest and longest boom in history.
The rapid industrialization resulted in higher demand for housing for workers and their families, it also put into question the working conditions. The rapid increase in the population resulted in usually poor working conditions, lack of adequate housing that did not have services of the first necessity. Many problems emerged during the industrial peak such as the lack of proper services, education or hygiene.

"The distribution of jobs within industry has, of course, changed greatly over time, and the distinctiveness of industrial work and working conditions has probably decreased. But their features have largely structured European social relations, putting people into large workplace units, with a clearly demarcated, collectively patterned division of labor, producing material commodities. This industrial society was the fertile ground of European class politics and class sociology." [8]

1.3 Deindustrialization

Deindustrialization process in Europe occurred between the 1950s-1960s and its definition was defined in many different ways. Many European cities faced deindustrialization for different reasons as in the city of Lodz the main factor that resulted in deindustrialization was the process of political and economic transformation while in Turin industries were largely destroyed during World Wars and most of them were moved away from the city.

"Deindustrialization is clearly much more than an economic process involving job loss. It involves the displacement of industry and industrial workers to the cultural periphery. Industrial demolitions serve as the ritual context within which a symbolic transformation can occur. " [9]

There is not only one definition that can determine the meaning of deindustrialization. Many sources provide different ideas for deindustrialization.

[6,7,8] Therborn G., (1995), European modernity and beyond : the trajectory of European societies, 1945-2000, Thousand Oaks, Calif. : Sage Publications, London, p. 68-71
[9] High S., W. Lewis David, (2007), *Corporate wasteland : the landscape and memory of deindustrialization*, p.25

According to Baumol (1967) and Fuchs (1968), deindustrialization is a natural process, largely characteristic for developed countries, resulting from accelerated economic growth and changes in the sectoral structure of the economy.

Cairncross (1982) and Lever (1991) define deindustrialization as a process that have four stages where "the economy starts from a decline in production and employment in the industrial sector and an increasing orientation towards service activities by reducing the share of industrial products in foreign trade, which results in a failure to maintain trade balance. In such a situation the country can no longer provide sufficient quantities of imports necessary to maintain domestic production, thus slowing economic growth allowing for the domination of the negative effects of deindustrialization." [10]
Rowthorn and Coutts (2004), introduced deindustrialization as a situation of reducing employment in industry, but without reducing total industrial production.

The economic crisis of the 1970s was the turning point in industrial history. The crisis ended the extension of industrialism over Europe and opened an era of relative de-industrialization.

"The latter has been most pronounced in the oldest industrial countries, with industrial employment decreasing by 12.6 percentage points in the UK between 1974 and 1989, by 11.7 in Belgium, by 9.2 in Switzerland, and further by 13.7 in Luxemburg (the record), 9.3 in France and 6.9 percentage points in Germany and Italy." [11]

The de-industrialization meant the closure of the whole or most parts of the factories. Starting from the 1950s the first to close was coal mining which was the main source of work for the UK and Belgium and the main part of economic and social history in countries like Spain, France or Germany. The next to follow the decline was the European textile industry and car industry.
In the capital cities like Brussels, London and Paris that faced the deindustrialization quickly found other activities in order to prevent the increasing crisis although in the other industrial areas like "in Wallonia, but also in major parts of northern England and in the English West Midlands, on Clydeside in Scotland, in the Basque Country, in Lorraine in France, Liguria in Italy, and Saarland and the Ruhr in Germany" [12] the deindustrialization led to long crisis that led to the decline and and abandonment.
In the case of Estern European countries the deindustrialization occurred due to capitalist restoration. "In the ex-GDR, which is of course a special case, one-third of all jobs disappeared between 1989 and 1992." [13]

Deindustrialization meant different things for each city. Turin and Łódź went through a great crisis during deindustrialization, both cities lost their main identity that developed them. The city of Lodz was born during industrialisation and the economic and social growth in Turin was also mainly based on the industrial sector.
During deindustrialization many industries shut down, people lost their jobs and both cities lost their spark and recognition. There was rising oversupply of industrial land, transforming into abandoned sites and urban brownfields.

[10] Tomljanović M. , Grubišić Z., Kamenković S., (2019), "Deindustrialization and Implementation of Industry 4.0 - Case of The Republic of Croatia" in *Journal of Central Banking Theory and Practice*, Volume 8, nr:3, p.134
[11] OECD, Labour Force Statistics, 1969-1989, Table 7.0
[12] Cf. Regiones europeas de antigua industrialización, Bilbao, SPRI, 1989. For Britain see also S. Fothergill and J. Vincent, The State of the Nation, London, Pan Books, 1985, pp. 32ff.
[13] Calculations from Die Zeit 7,8.1992, p. 33, and Frankfurter Allgemeine Zeitung 14.1.1993, p.11

1.4 Brownfields and dismissed industrial areas

Brownfield area in terms of industrial city is no longer in use that was left abandoned after industrial activity was dismissed or activities related to the industrial sector. These areas can be often contaminated but not always, they need reclamation and revitalisation and they are an important part of industrial heritage. These areas, depending on the time when they were built, are usually located in downtowns of the city, near rivers, railways or other mobility systems. The changes in the world economy had an impact on the change of the cities. Industry was no longer the main agent that was developing the cities.

"The introduction of the principles of sustainable development to post-industrial areas seems necessary because it is possible to use the existing degraded or neglected areas of cities so that these areas can serve future generations. In the era of sustainable development, when the natural environment is protected, it is already necessary to re-use urbanized areas. At the same time, the evitalization of these places brings with it many problems, both social, economic and spatial, depending on the local conditions." [14]

In many countries the re-use of urban brownfields has been considered socially, economically, environmentally and culturally important for the development of cities and a valuable alternative to urban sprawl.

"Large-scale projects are promoted by most European cities as a symbol of identity, as an activity to transform the use of brownfields or eliminate outdated uses, and to stimulate the economy. The actual contribution to urban development usually does not exceed 5 %, but is often essential for creating a new image or achieving a new economic profile." [15]

According to the European Commission - " Brownfield regeneration is a key policy objective to help cope with rising populations in urban areas in some parts of the EU. In 2005, 500,000 hectares of brownfield land were estimated to be available for development in Europe." [16]

The regeneration and redevelopment of urban brownfields and dismissed industrial sites can help to densify cities and slow down urban sprawl as well as enhance urban space and develop new vibrant and livable districts of the cities. Regeneration of dismissed industrial areas support the densification of urban areas rather than expansion beyond the city barriers which can have a positive effect on the reduction of emissions and play an important role in the mitigation of climate change mitigation. Most of the brownfields areas and dismissed industrial sites are located within the city barrier and mobility network which can reduce the commuting time and the gas emissions associated with transportation means.

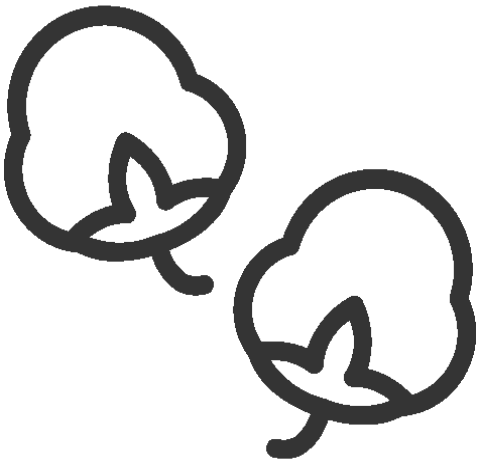
[14] Denis M., (2017), *Tereny Poprzemysłowe w Dobie Zrównoważonego Rozwoju*, Studia Miejskie, p.25-37
[15] Siebielec G., (2012), *Brownfield redevelopment as an alternative to greenfield consumption in urban development in Central Europe*, Urban SMS, p. 6
[16] European Commision, (2013),"Brownfield regeneration" in *Science for Environment Policy*, Issue 39

2

TURIN and ŁÓDŹ POST-INDUSTRIAL CITIES

ŁÓDŹ/
TURIN

ŁÓDŹ
COTTON INDUSTRY



Łódź/
Cotton industry

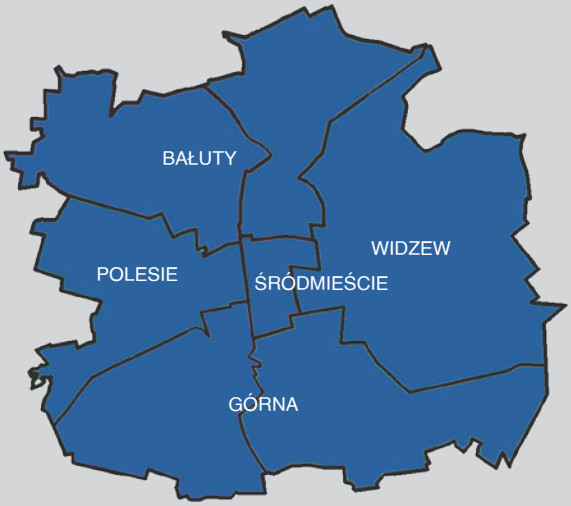
Country	Poland
Region	Łódź Voivodeship
First mentioned	1332
City rights	1423

Area	
City	293.25 km^2
Highest elevation	278 m
Lowest elevation	162 m

Population	(31 December 2020)
City	672,185
Density	2,320/km^2
Metro	1,100,000

Districts:
Śródmieście - central downtown area
Polesie - western residential area
Widzew - eastern industrial and residential area
Bałuty - northern industrial and residential area
Górna - southern residential area

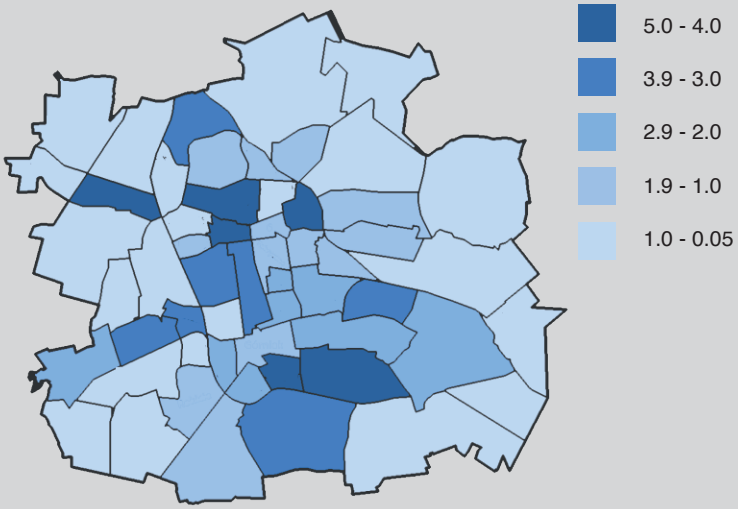
DISTRICTS OF ŁÓDŹ



POPULATION
672,185
DENSITY OF INHABITANTS / km²
2264,5

51.9% **48.1%**

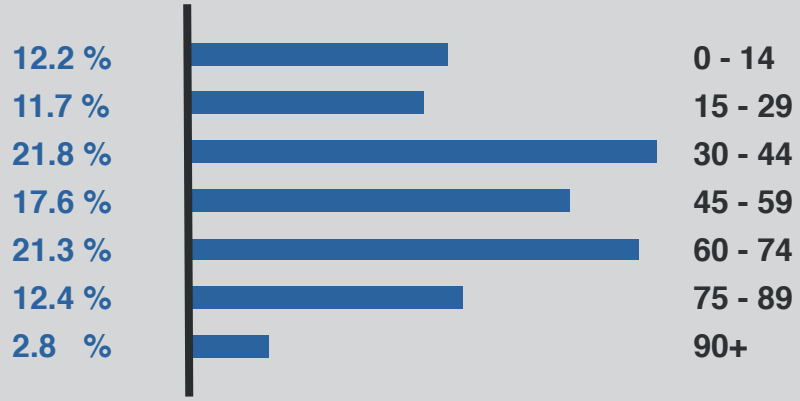
POPULATION OF ŁÓDŹ BY DISTRICT



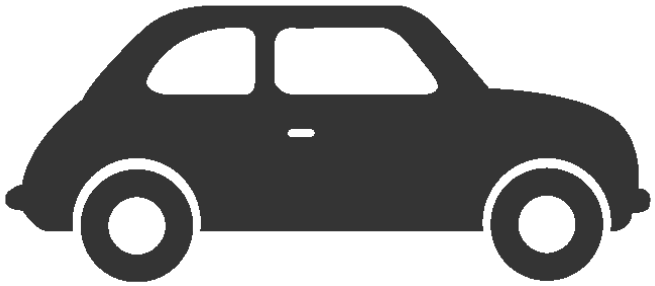
UNEMPLOYMENT RATE
5.3%

NUMBER OF STUDENTS FOR 2021
76,897
GRADUATED IN 2021
17,950

POPULATION BY AGE



TURIN
AUTOMOBILE INDUSTRY



Turin/
Automobile industry

Country	Italy
Region	Piedmont
Metropolitan city	Metropolitan City of Turin (TO)

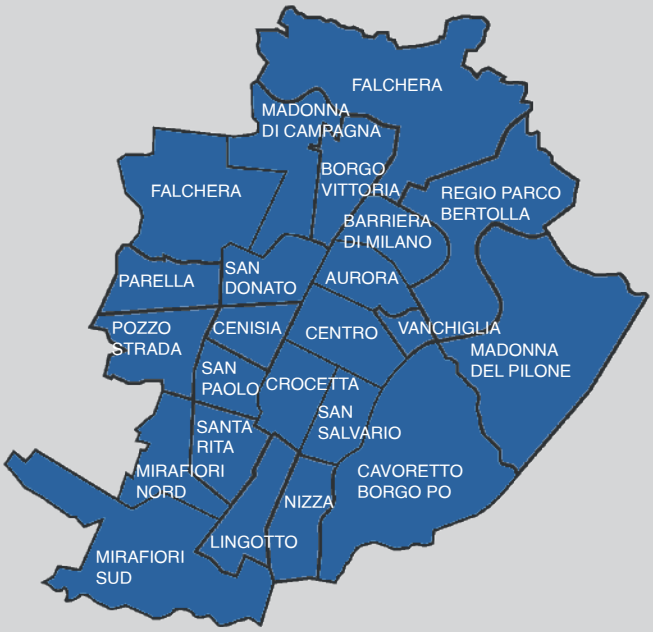
Area	
Total	130.17 km^2
Elevation	239 m

Population	(31 December 2021)
Total	848,885
Density	6,500/km^2

Districts:

City Center
San Salvario
Crocetta
San Paolo
Cenisia
San Donato
Aurora
Vanchiglia
Nizza
Lingotto
Santa Rita
Mirafiori Nord
Pozzo Strada
Parella
Le Vallette
Lanzo
Barierra di Milano
Falchera
Barca- Bertolla- Regio Parco
Madonna del Pilone
Borgo Po – Cavoretto
Mirafiori Sud

DISTRICTS OF TURIN

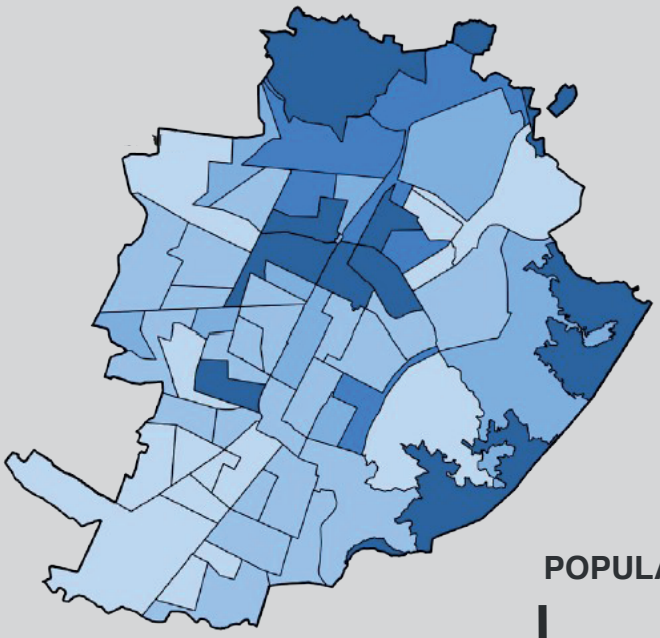


POPULATION
848,885
DENSITY OF INHABITANTS / km²
6527

48.8% **51.2%**

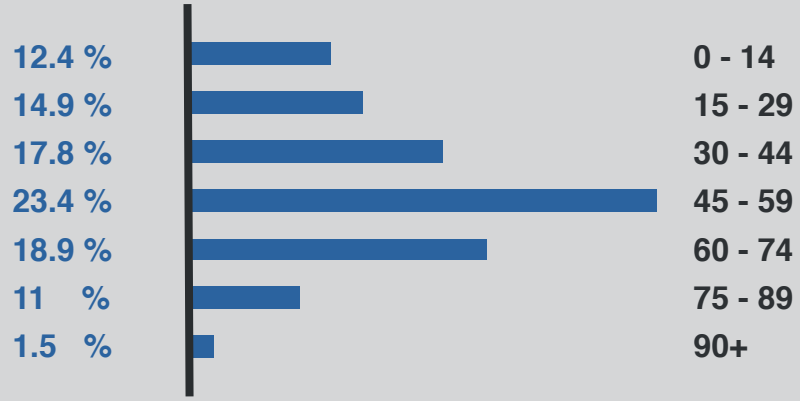
UNEMPLOYMENT RATE
7.5%

POPULATION OF TURIN BY DISTRICT



NUMBER OF STUDENTS FOR 2021
ca. 110,911
GRADUATED IN 2021
ca. 22,618

POPULATION BY AGE



ŁÓDŹ

2.2.1 The beginnings of Łódź / Agricultural Łódź

Łódź, also known in English as Lodz, is the third largest city in Poland and a former industrial center. Located in the central part of the country. It is the capital of Łódź Voivodeship.
"The beginnings of Łódź date back to the 14th century, the first records are from 1332, although some sources say that this settlement already existed in the 12th century. It was then a small village situated in the background of the primeval forest, which is part of the Kujawy bishops' estate. At the beginning of the 15th century, in 1423, King Władysław Jagiełło issued a location privilege city, and from that time to this day, Lodz has municipal rights. From then until the 18th century the town remained a small settlement on a trade route between the provinces of Masovia and Silesia."[1]

As a majority of small commercial and agricultural towns at the time, it was a market and an inn for a dozen or so neighboring villages. Also, like most cities of central Poland, it never had protection walls nor the moat, it was an open city.
The location of Łódź on the sidelines, away from important trade routes, on the border Wielkopolska, Mazowsze and Małopolska, in the watershed, in the depths of the forest, effectively limited her development. For several centuries it was a provincial, backward and poor town plagued by fires and epidemics, where the vast majority of residents were engaged in agriculture.

"In the 16th and 17th centuries, Łódź had between 400 and 700 inhabitants, and at the end of the eighteenth century town had only 190 inhabitants and only 44 houses, the entire building infrastructure was wooden, no road was paved. Łódź was one of the smallest and poorest cities of central Poland. It was the period of the so-called "Agricultural Łódź." [2]

2.2.2 Urban development of Industrial Łódź

"The beginnings of industrial Łódź date back to the period after 1820, when the authorities of the autonomous Kingdom of Poland undertook a program of modernization of the country.
During the periods of the Duchy of Warsaw and Kingdom of Poland, Łódź had been incorporated into the Russian Empire." [3]
"At the beginning of 1816 many craftsmen were interested in moving to the Kingdom of Poland for work where they could be offered many privileges. Migrants from the western countries such as Prussia, Czech, Saxony, Silesia or Portugal and France started to massively arrive in the Kingdom of Poland. Due to the huge wave of incoming workers, four years later the government decided to initiate a development plan and established several industrial districts in the western part of the Masovian Voivodeship. The location was chosen to be the one close to the border between the Russian Empire and the West. Łódź became the largest new industrial center known for its cotton factory." [4]

At that time, in two stages, a large-scale system of handicraft settlements was marked out, the first of which "Nowe Miasto" (New Town) could acquire an urban character with time, and the remaining ones were actually a semi-rural structure. This system was designed rationally for the purposes of early industry, but after half a century it became obsolete for the needs of the emerging city, both in terms of internal structure and selection of investment areas.

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[1] Koter M., (1969), Geneza układu przestrzennego Łodzi przemysłowej, Państwowe Wydawnictwo Naukowe, Warsaw, Prace Geograficzne nr 79, p: 25-36
[2] Barwiński M., (2009), Rozwój przestrzenny i zmiany funkcjonalne Łodzi - uwarunkowania geograficzne, ekonomiczne, polityczne, Geografia w szkole, nr 6 October/December 2009, Warszawa, p. 38-50.
[3] Kizwalter T., (1987), Ludzie i idee oświecenia w Polsce porozbiorowej, Wydawnictwa szkolne i pedagogiczne, Warszawa
[4] Zysiak A., (2019) From cotton and smoke : Łódź industrial city and discourses of asynchronous modernity, 1897–1994, Kraków, Jagiellonian University Press, p:40

The design of the spatial layout of the New Town is regular, geometric and very clear. The most important element of the arrangement was a centrally located market square, with a unique octagonal shape (today's Square Freedom). The market square was situated on the axis of the new Piotrków route. Crisscrossing in the middle of the square, the exit streets created a characteristic, regular compositional cross, which became the backbone of the entire urban layout of the New Town.

Two years after the founding of the New Town, the so-called "Cloth gardens" (Fig.1). They formed an extension of the settlement to the east. Their rise was related to the fashionable concept according to which the development of industrial production should be combined with agricultural production. The division of human working time between work was promoted in industry and farming. According to this utopian concept, the industrial settlements of that time were equipped with extensive agricultural (horticultural) lands, allocated to settlers along with square construction. The primary function of these gardens was to create a relative possibility of food self-sufficiency for the inhabitants.

The authorities of the Kingdom of Poland played a major role in bringing the settlers to the newly founded settlement, granting them numerous privileges, concessions and credits.
"According to M. Koter (1970, 1984), despite the fact that the New Town was the most valuable morphological unit of industrial Łódź in terms of urban planning, it was not decided about the incredible development of the city, but the settlement of "Łódka" founded a few years later (Fig. 2). There were many colonies and textile settlements in the country at that time, and Łódź one did not stand out among them in terms of importance. However, Łódka was the first and the largest settlement in the Kingdom of Poland specialized in the production of linen and cotton." [5]

The linen-cotton settlement Łódka was located in 1824, about 4 km. South from New Town, in the valley of the Jasień River. The main reasons for this location were local water conditions, because in the first half of the nineteenth century, still in Poland the primary source of energy was the energy of water decline. Moreover, the textile industry needed large amounts of clean water for technological processes. A settlement Łódka was built based on completely different spatial assumptions than New Tow. In almost all production was carried out in houses that were also used as workshops. Therefore, the New Town could have had a compact layout and a small surface. On the other hand, the production of cotton and linen, more mechanized at that time, used the entire system of mechanical plants, which were moved by water energy.
In addition, there was a need to keep several hundred meters spacing between individual plants to ensure adequate water decline. That is why Łódka settlement had to be more stretched and much larger in area than New Town. The basic industrial zone was marked out in the valley of the Jasień River. It laid out the so-called "Has a water-factory", that is, extensive plots of land intended for establishing industrial plants.

The third morphogenetic unit of early industrial Łódź was a spinning colony intended for Czech and German settlers - Nowa Łódka. Its axis was Zarzewska Street (now Przybyszewskiego Street), which was intersected by Widzewska Street (currently Kilińskiego Street) in its central part. At the confluence of Zarzewska Street with the Piotrków Route,

[5] Koter M., (1969), Geneza układu przestrzennego Łodzi przemysłowej, Państwowe Wydawnictwo Naukowe, Warsaw, Prace Geograficzne nr 79, p: 74-77

the central square of the new spatial unit, the so-called Upper Market Square (today Reymonta Square).

The layout of the remaining streets in Nowa Łódka was adapted to the course of the two main streets, i.e. Zarzewska and Widzewska, which resulted in their deviation in relation to the Piotrków route. In 1827, the developed area of the city was expanded by the colony of Ślązaki (Szleheng).

Almost simultaneously with the construction of the first industrial plants, the establishment of a colony for weavers of linen products and cotton, along the Piotrków route. This made it possible in the near future to connect Łódka with Nowe Miasto. At the moment of the merger of both settlements, the Piotrkowski tract took on the character of a street and was called Piotrkowska street.
This is how a characteristic element of the plan of Łódź was formed, a simple, 5-kilometer long sequence of urban buildings. It created a common urban axis of the entire urban complex, which consisted of three genetically and functionally different settlement organisms - the Old and New Towns and Łódka (Fig. 3). For the next half a century, this zone was the focus of the whole urban development.

As a result of the dynamic development of the city, in 1840 the area of Łódź was enlarged by creating the so-called Nowa Dzielnica (Fig.4). The new morphological unit occupied the area of the government forest, filling the gap between Nowe Miasto and its cloth gardens to the north and the settlement of Łódka to the south. The spatial layout of Nowa Dzielnica was adapted to the rectangular layout of Nowe Miasto streets and the linen and cotton territory along Piotrkowska Street. The central morphological element of the new spatial and functional unit was the Water Market, located at the intersection of the two most important streets of the district - Główna and Targowa. It was the largest city square in Łódź at that time.
The Water Market, together with the first public park in Łódź, has become one of the most important public spaces in the city.

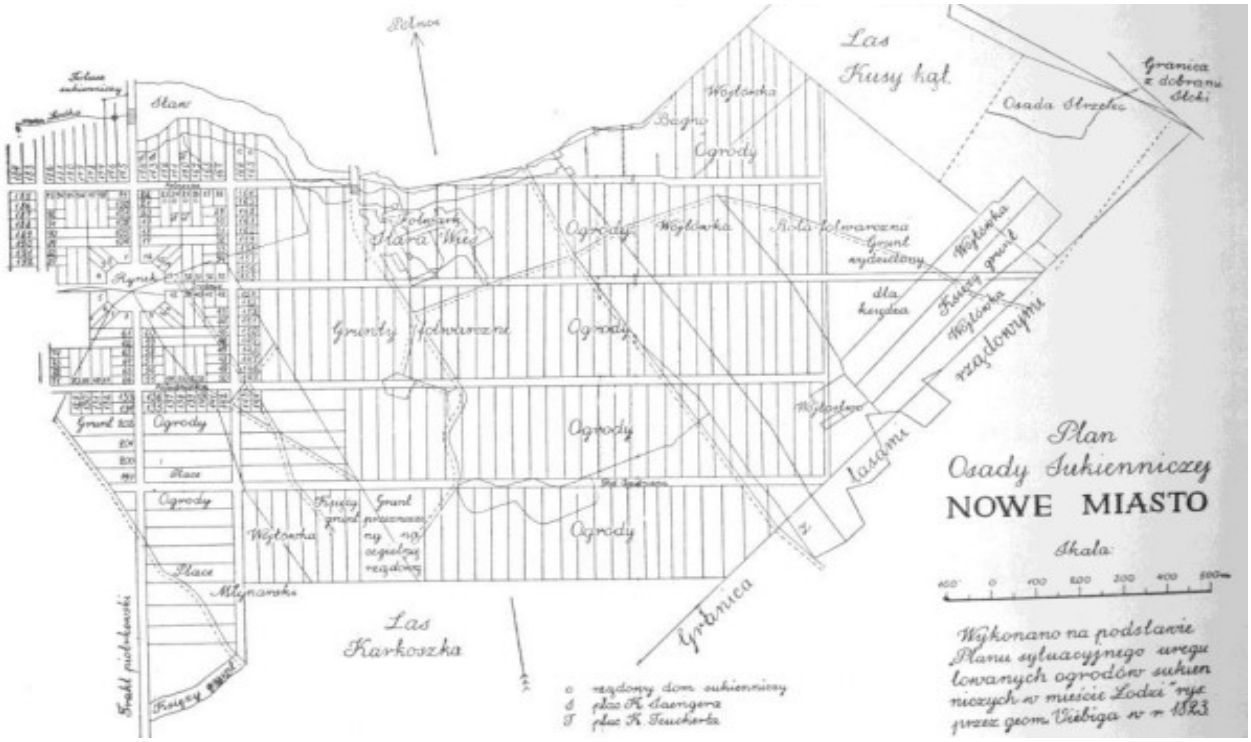

Fig.1 Plan of the textile settlement Nowe Miasto from 1823
Source: Wirtualna Łódź http://www.historycznie.uni.lodz.pl/przestrzenny.htm

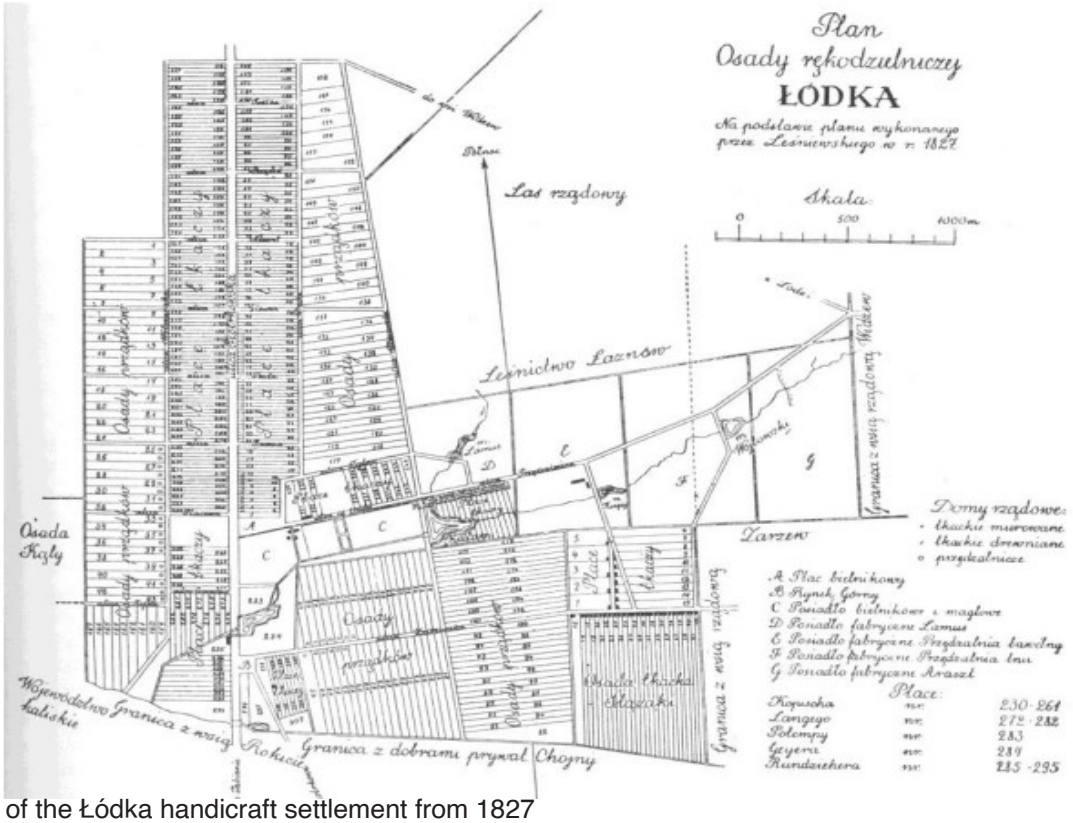

Fig. 2. Plan of the Łódka handicraft settlement from 1827
Source: Wirtualna Łódź http://www.historycznie.uni.lodz.pl/przestrzenny.htm

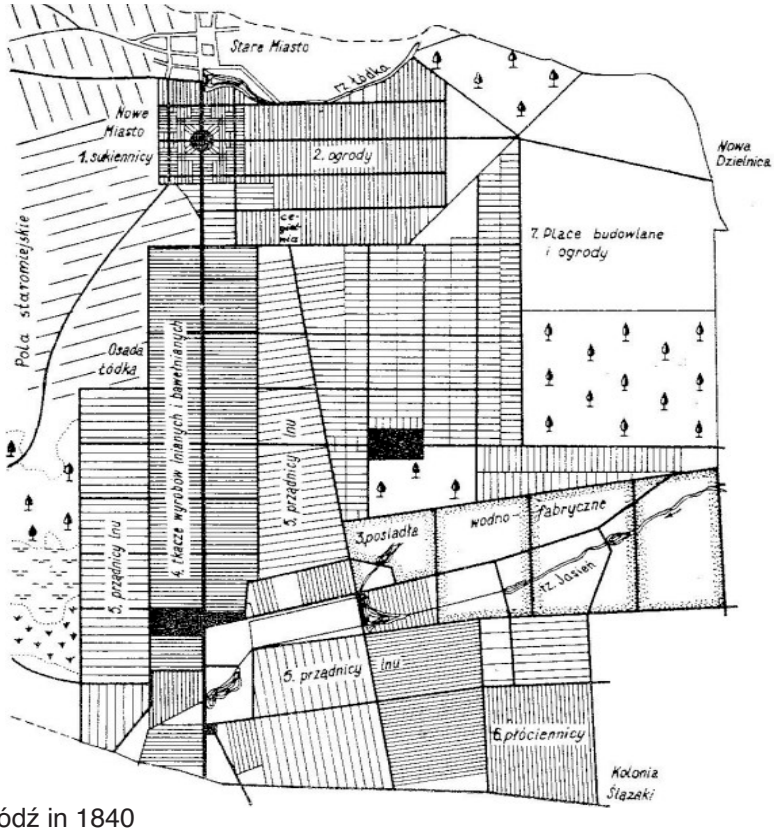

Fig.3 Urban units in Łódź in 1840
Source: (prepared by KOTER.M, (1970),Geneza układu przestrzennego Łodzi przemysłowej, p.104)

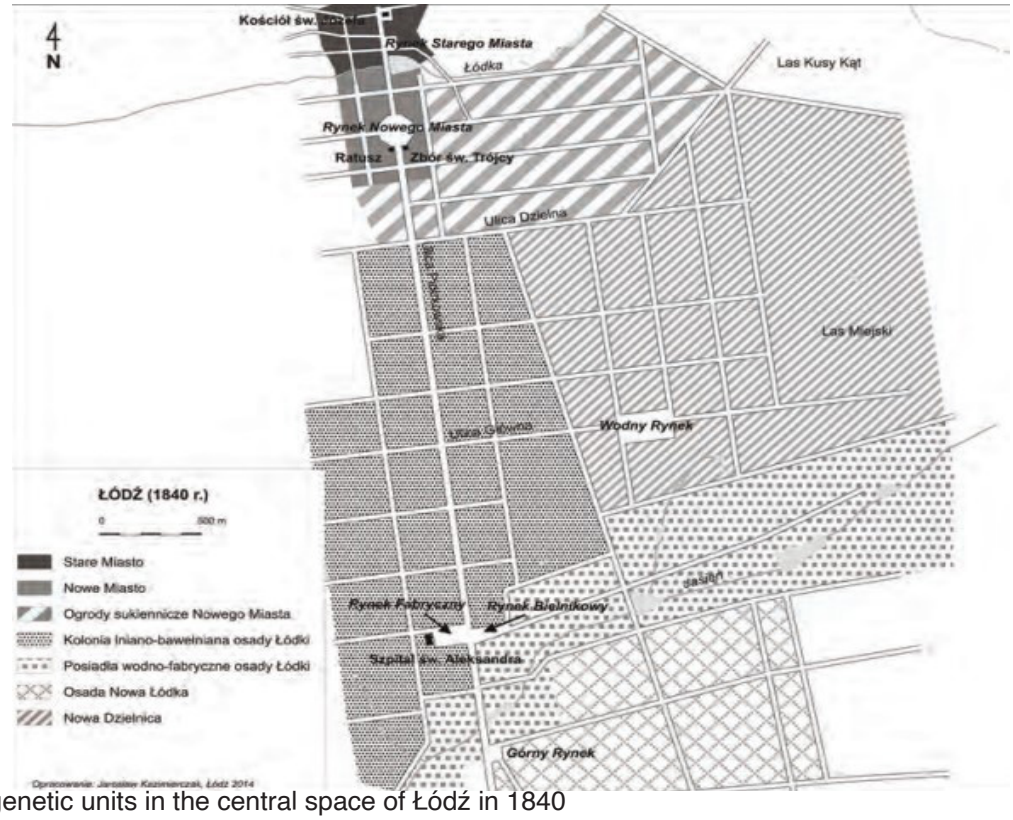

Fig.4 Morphogenetic units in the central space of Łódź in 1840
Source: (prepared by Kazimierczak J., (2014), *Wpływ rewitalizacji terenów poprzemysłowych na organizację przestrzeni centralnej w Manchesterze, Lyonie i Łodzi*, p.181)

The key element of the central space in Łódź in the first period of its formation was Piotrkowska Street. Although it connected the three oldest spatial and functional units of Łódź, it did not contribute to their integration. This resulted in their independent development. Along Piotrkowska Street, all city squares of early industrial Łódź were located, with the exception of the Water Market Square. The most representative was the New Town square with the original octagonal shape, next to which the town hall and the Evangelical church were located. Apart from these objects, the physiognomy of the central space in early industrial Łódź had a small-town character. North of the New Market Square, The Old Town Square was located in the city. In the south, in Łódka, these were Rynek Bielnikowy with an area of 1.3 ha, Rynek Fabryczny - the largest one at Piotrkowska Street with an area of 2.74 ha, and Rynek Górny with an area of 0.66 ha. Later, at the southern end of Piotrkowska Street, Niepodległosci Square was designated, the area of which is 3.83 ha.

A characteristic spatial and functional element of Łódź at that time was construction of factory buildings with residential functions, which still exist today, intended for employees of a given industrial plant. The apartment is occupied by a worker, it was of an official character and was usually intended for workers qualified. It was located in the immediate vicinity of the industrial plant and often also the owner's mansion (palace). The spatial form of this type of housing estate was very different - from a series of buildings to extensive urbanized housing estates, with shops, schools, fire brigades. It was referred to as "Jurydyki", the largest belonging to Izrael Kalman Poznański, Juliusz Heinzel and Karl Wilhelm Scheibler. The most outstanding example of this type of functional and urban assumptions is the one built by Scheibler, the so-called "Księży Młyn ''.

The process of creating the city of Łódź was nearly completed in 1860 but the city remained just as an industrial center which lacked basic urban developments that European cities should have provided starting from important institutions such as schools or hospitals to proper sewerage and paving. Rapid urbanization and industrialization took place in the years 1870-1914 on the basis of the original layout, with minimal transformations, although with the incorporation of new areas. At that time, the city increased its population from approximately 30 thousand to nearly half a million and included the working-class suburbs outside the borders.

"After the collapse of the tragic and reckless January Uprising in 1863, the Kingdom of Poland was compulsorily unified with Russia and lost its last remnants of autonomy. While Russification was a national tragedy for Poles, from the economic point of view this integration boosted industrial growth."[6]

"Inasmuch as the Kingdom of Poland was to become just a part of the Russian Empire, the expansive Russian market was opened to its products, which now could reach glamorous Petersburg, fast-developing Ufa, or newly-fortified Vladivostok. Furthermore, in 1877 Russian trade policies changed from mercantilism to protectionism. As a result, between 1879 and 1900 three-quarters of all products manufactured by Łódź's factories were exported to Russia."[7]

[6] Zysiak A., (2019) From cotton and smoke : Łódź industrial city and discourses of asynchronous modernity, 1897–1994, Kraków, Jagiellonian University Press, p:40
[7] Fijałek et al., Łódź: dzieje miasta do 1918 r., 248-49

While Łódź gained a big client in the east it slowly started to disappear from the European market as the commercial network shifted to Russia.
The European economy was no longer the interest point for Łódź industry, instead Łódź was becoming the main industrial provider for the Russian Empire which was rather isolated from the western networks. This shift could be destructive or fairly constructive for industrial Łódź, on the one hand markets and raw materials were located in the East, while on the other the transfer of knowledge, professionals and equipment built a system of circulation with the West.

"Plugged in this fashion into the uneven global economy, Łódź's textile production experienced significant boosts in output and revenue. In consequence, the city's industries were transformed into large, modern, mechanized mills, employing hundreds and even thousands of workers. In panoramic views of Łódź over the next century, hundreds of factory chimneys came to dominate the skyline."[8]

Fig.5 Worker's housing near the Scheibler factory, "Księży Młyn"
Source: postcard from Łukasz Biskupski's collection

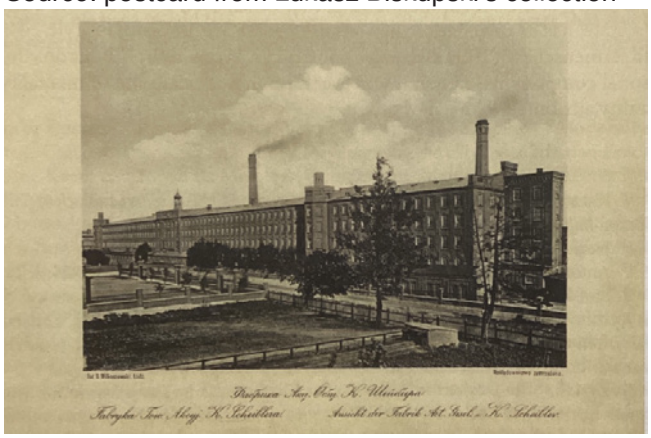

Fig.6 Karol Scheibler Factory
Source: Bronisław Wilkoszewski, 1896, Archiwum Państwowe w Łodzi, PL 39607 A-7 14 (Wikimedia commons)

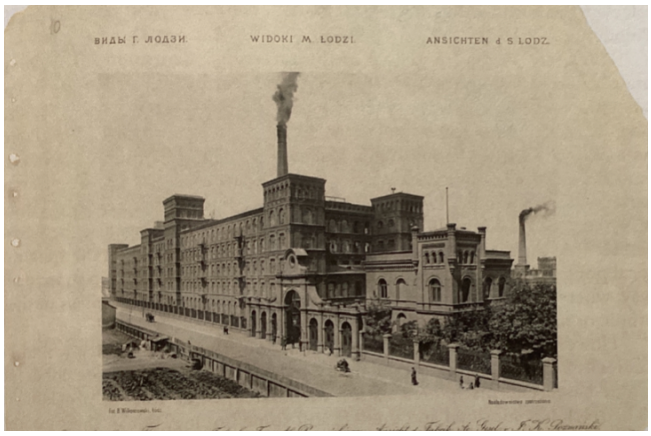

Fig.7 The Izrael k. Poznanski Factory
Source: Bronisław Wilkoszewski, 1896, Muzeum Miasta Łodzi, MHMŁ/I/2096 (Miastograf.pl - digital collection)

[8] Puś, Dzieje Łodzi przemysłowej: zarys historii ., 49-60

2.2.3 1860- 1910 Construction Boom

In the years 1860-1890, Łódź was going through the phase of development of an early industrial city in the phase of large-scale industrial development. It is the most intense period in the history of the city's industrial development. Łódź was definitely becoming the largest industrial center textile industry in the Kingdom of Poland, which was also important in Europe at that time.

Contrary to the first stage of shaping the central space, which was a centrifugal process, the second stage in the period of development of large-scale Łódź was characterized by a centripetal development. It was mainly related to the rapidly growing population of the city.
An important town-forming factor was also the construction of the Warsaw-Vienna railway, to which in 1865 the "Łódź factory railway" was connected through the station in Koluszki. It made it possible to improve and reduce the costs of transporting raw materials and finished products, which in turn resulted in the further development of the textile industry in Łódź.

The construction of the Łódź Fabryczna railway station in 1868 resulted in the development of the areas located in the northern part of the New District, which gained a large-city character of buildings. To the north of the station, the Market Square was built.

Łódź was then called "Polish Manchester" and "the city of a thousand chimneys, one hundred palaces and one street ".

Łódź encountered huge migration waves between 1860 and 1913, where the population increased fifteen times, from 32,500 to almost half a million.

Many of the migrants were Jews that started to rapidly settle down in the city after the legal restrictions against their nation were terminated in Russian Poland in the 1860s, they could finally live and invest their capital outside the traditional ghettos.

"At a rapidly accelerating pace many blazed their trails to commercial or artisan careers, the traditional occupations of Jews in Poland at the time. Others, however, invested in residential property or succeeded as industrial tycoons. Izrael Kalmanowicz Poznański, the leader of the local Jewish community, became nearly as rich as Karl Scheibler, the most powerful of Łódź's German bourgeoisie."[9]
"By the end of 1913s, Poles accounted for almost 50% of all Łódź inhabitants, while 36.4% were Jews and only 11.5% Germans."[10]

The territory of the city was not prepared, nor was it to rationally absorb a huge number of new inhabitants, or the proper localization of a large number of new factories. In 1905, 344 thousand inhabitants occupied the same area where in 1840 lived only 15 thousand people.

Before the end of World War I, Łódź was characterized by a very poor cultural life, which resulted from the lack of educated cultural traditions of the city's inhabitants.
The creation of cultural institutions was also not conducive to the isolation of national groups living in Łódź at that time, including Jews and Germans.
Despite the dynamic spatial and population development, Łódź did not perform administrative functions until the end of World War I. The lack of new center-forming institutions contributed to the stagnation in the development of the central space. It was limited to the quarters adjacent to Piotrkowska Street, mainly in its northern part (between Główna

[9] Zysiak A., (2019) From cotton and smoke : Łódź industrial city and discourses of asynchronous modernity, 1897–1994, Kraków, Jagiellonian University Press, p:41
[10] Puś, Dzieje Łodzi przemysłowej: zarys historii

Street and the New Town Square), and to smaller enclaves of the location of public institutions along Spacerowa and Dzielna Streets.

Over time, and with some difficulty, the population of half a million in Łódź developed a large part of typically urban functions, especially in the field of culture, availability and financial services for industry, and to some extent recreation. The functions of public administration, education and transport remained essentially underdeveloped.

2.2.4 Łódź during two World Wars/ 1918-1949

During World War I, Łódź was under German occupation and interrupted the process of its economic development.
In 1915, the German authorities took over the occupation and the inclusion of a number of surrounding suburbs and villages within the administrative boundaries of Łódź, including Chojny and Bałuty, which at that time had 30 and 100,000 thousands of inhabitants, respectively and they were probably one of the largest villages in the history of world settlement. However, the incorporation of the new areas was many years later, so instead of relatively empty areas, allowing for the discharge of the excessive density of buildings, Łódź absorbed areas that were already highly urbanized, moreover, urbanized very chaotically and thoughtlessly. The decades-long period of urban inactivity of the authorities was completely enough to make a well-planned, flourishing and rapidly growing city a neglected behemoth.
The textile industry, and with it the city of Łódź, throughout the interwar period was in a state of crisis.

Despite this, Łódź remained an industrial center in the interwar period, a city of textile workers and the center of the Polish textile industry. In addition, Łódź gained new city-forming functions, mainly administrative, which was related to Poland regaining its independence. In 1919 the Łódź Province was created, in 1920 the Diocese of Łódź was established, and in 1921 the Łódź garrison of the Polish Army was created. Among other things, thanks to these functions, numerous seats are located in the city organizations and institutions, new schools and hospitals are built, and a primary one appears municipal infrastructure - water supply, sewage, gas. However, with a functional structure, the city was dominated by industry.

Thus, the method was preserved in the interwar period, the organization of the central space shaped in the period of large-scale Łódź. In the 1930s, the range of the modern downtown district was finally delimited, which includes the areas inside the railway perimeter.

The distribution of service, residential, industrial, communication and recreational facilities in the city center of Łódź, shaped up to that time, was a consequence of the uncontrolled development of the city from the 1860s to the end of the 1930s. In 1938, industrial areas were concentrated mainly in three downtown areas: at railway stations (Łódź Fabryczna and Łódź Kaliska), on water-factory estates and in the former cloth gardens of Nowe Miasto.

The period of World War II dramatically changed its shape from the beginning of the 19th century ethnic structure of the inhabitants of Łódź. During the occupation, the Germans established a ghetto, in which they closed

approx. 250 thousand Jews from Łódź and its vicinity. Only 830 lived to see the liberation of the people from among the ghetto inhabitants. During World War II, Łódź suffered very little losses in buildings, by far the most tragic were the human losses.

2.2.5 Post war - Łódź as a new cultural center

Unlike many other Polish cities, Łódź was not destroyed during World War II, which paradoxically had a pejorative effect on the preservation of the material substance of the historically shaped central space of the city. In other Polish cities, war damage became a factor determining the reconstruction of historic centers. In Lodz, however, the nineteenth-century city tenement houses were successively demolished and replaced with modernist buildings.

"Despite all the blows , at the end of the war, Łódź served as a vicarious capital of Poland and it was bigger than Warsaw with regard to its number of inhabitants" [11]
"After 1945, the city became a magnet for thousands of refugees. State institutions moved from Lublin and the intelligentsia flocked to the city as Warsaw lay in total ruins." [12]
"After the biggest wave of migration, in 1945, the following years 1946-1950 saw another 125,000 new residents arrive. By the 1948 over 200,000 more people had settled in Łódź." [13]
"From 1945 onwards, the city passed through a phase of rapid development that took it far beyond its former industrial past. Now it possessed an administrative apparatus of nationwide importance, and outposts of culture and scientific hubs emerged - for the first three years after the war it was the most important city in the country." [14]

Five public higher institutions were established by the 1949 such as Academy of Fine Arts, University of Technology, Łódź University and famous National Film School in Łódź founded in 1948 that released worldwide known film directors such as Roman Polański or Krzysztof Kieślowski.
The opening of higher education centers in Łódź attracted many students which resulted in a huge influx of intelligentsia, people such as writers, artists, actors, intellectuals started to arrive in the city.
"…in the decades to come, the sociology of work and mass culture was especially strong in this industrial city. Many editorial offices and publishing houses" [15] "were founded in Łódź and local cafes were full of writers, artists, the literati, actors and intellectuals." [16]
"Łódź, a half illiterate city with no proper material base, in just a few months became the center of cultural life and a respected academic center." [17]

"The general framework organizing postwar urban planning in Europe was functionalism. However, in Łódź this was neither implemented by a governmental reform, nor was it copied from Western urban planners. In the local context, functionalist ideas, part and parcel of a broader theoretical movement, were introduced by an international modernist artist from the interwar period, Władysław Strzemiński."[18]

Strzeminski proposed the idea to transform Łódź into functionalism city by moving and building new structures. He wanted to place the center on the north part of the city and place new functionally diversified districts along the railway between existing Łódź and the neighborhood town of Zgierz. He concluded his proposal with the description of new housing districts of the future as evenly spaced and unified blocks of flats with a road

[11] Żelazko J., ed., Rok 194S w Łodzi: Studia i Szkice (Łódź: Instytut Pamięci Narodowej, 2008), 26.
[12] The Polish Committee of National Liberation officially proclaimed on 22 July 1944 by Polish communists under Moscow auspices, in opposition to the Polish gover- nment in exile.
[13] Rosset, "Stosunki ludnościowe, » 33.
[14] Wolaniuk A., Funkcje metropolitalne Łodzi i ich rola w organizacji przestrzenne; (kódé: Łódzkie Towarzystwo Naukowe, 1997), 46.
[15] Kędzierski J., "Czytelnictwo gazet, czasopism i książek wśród dorosłej ludności miasta," in: Łódź w latach 1945-1960, ed. Edward Rosset (Łódź: Wydawnictwo łódzkie, 1962), 419-26.
[16] Ratajska K., O niezwykłych łódzkich kawiarniach. U Roszka, Fraszka, Honomika (Łódź: Ksiezy Mlyn Dom Wydawniczy, 2018).
[17] Puś, Dzieje Łodzi przemysłowej: zarys historii, 9

network spread accordingly.
The ideas of Strzeminski were rather radical although Łódź needed functional residential districts.

"An overcrowded city center was not the place for a decent way of life and this space would meet other public functions . The division of districts was mainly aimed at separating work from living spaces."[19]

"Osiedle" known also as "micro rayon" (unit of socialist invention) became the key unit of postwar urban planning in Łódź. It was a unit that was located on the periphery of the city and would satisfy all needs of its residents. That said "osiedle" needed well-developed infrastructure as well as basic services to satisfy all the everyday needs of its inhabitants.

"For sanitary reasons, it was planned that factories be kept in the same place as before, the southern part of the city which was relatively sparsely built-up. Furthermore, housing estates would be separated from industrial areas by greenbelis (for example, parks)." [20]

"The proper development of green areas was strongly emphasized, as in the catchy title "There is nothing to breathe with in Łódź!"[21] Not only was this a problem for sanitary reasons, but also because of the recreational needs of the working classes and air pollution." [22]

"The separation of housing from industrial areas led journalists to pay special attention to the question of public transport. It was often stated that the street grid and the public transport system should be adjusted to the needs of workers, and travel between housing estate and workplace." [23]

Fig.8 The "Widzew-Zachód" housing estate, ca.1965
Source: Ignacy Płażewski, Muzeum Miasta Łodzi, MHMŁ/I/4710/16 (Wikipedia commons)

In the post-war period, in the years 1946–1989, the poorly developed central space in Łódź, which had a linear-enclave character, was transformed by the new socialist authorities according to modernist concepts of building cities with privileged individual transport.

The construction of large communication arteries increased the existing disintegration of downtown morphogenetic units in which the central space developed before the outbreak of World War II.
In the 1970s, Kościuszko Avenue and Narutowicza Street were subordinated to car transport and the extended tramway communication. Piotrkowska Street, on the other hand, was clearly divided into the differently used northern and southern parts as a result of the construction of the East-West Route. The investment was accompanied by the transformation of the quarters located between contemporary streets: Piotrkowska, Roosvelta, Sienkiewicza and Brzeźna, as a result of which the Śródmiejska Dzielnica Mieszkaniowa and the Łódź business district were created. They are characterized by a distinctly different physiognomy in relation to the buildings of the historic downtown district.

Fig.8 The "Widzew-Zachód" housing estate, ca.1965, author Ignacy Płażewski, Muzeum Miasta Łodzi, MHMŁ/I/4710/16 (Wikipedia commons)

[18] Kulić V., (2017), The Builders of Socialism: Eastern Europe's Cities in Recent Historiography in Contemporary European History 26, no.03
[19] Łódź musi być pięknym miastem, Dziennik Łódzki, no.118 (1946)
[20] Łódź przyszłości", Express Ilustrowany, no. 305 (1949)
[21] "W Łódzi nie ma czym oddychać," Express Ilustrowany, no. 91 (1946)
[22] "Dymy na Łódzkim niebie," Dziennik Łódzki, no. 18 (1947); "Zieleń - najlepszy filtr skażonego powietrza," Kurier Popularny, no. 172 (1946)
[23] "W trosce o człowieka pracy dogodna komunikacja otrzymają mieszkańcy peryferii miasta," Express Ilustrowany, no. 20 (1948)

As a result of spatial and functional transformations in the post-war period until 1989, there was a recession of the central space in Łódź and its dispersion, which made it difficult to identify the metropolitan center.

In the post-war period, the downtown district of Łódź was not enriched with a significant number of representative public buildings.
A new element in the central space of Łódź, introduced during the development of the socialist city, were the “Central”, “Uniwersal” and “Magda” department stores. From the 1960s to the end of the 1980s, these were supra-local facilities. All of them are located in the immediate vicinity of Piotrkowska Street, both in its northern and southern parts.
In the first three stages of the development of the central space in Łódź, a clear city center was not shaped. Śródmieście was degraded and subordinated to housing, production and communication functions.
It was a conglomerate of service, residential and industrial-storage development areas. It lacked an attractive public space.

TURIN

2.3.1 Turin, short overview

Turin is a city located in northern Italy. It is the capital city of the Piedmont region and of the Metropolitan City of Turin. It was the first Italian capital from 1861 to 1865. The city is set against the curtain of the Alps between two major rivers, the Po and the Dora. Turin is also known for the Italian automotive industry, with the headquarters of FIAT, Lancia and Alfa Romeo.

The history of Turin dates back to 218 BC and it was called "Taurasia". In 1280 Turin passed into the hands of the Savoy family and was incorporated into the Duchy, and this city with already 20,000 inhabitants became home to major cultural innovations such as the University of Turin in 1404. Furthermore its position of interface between Central and Western Europe, thanks to the Alpine passes, and its crossing-point over the Po were major assets for trades.
1563 is the year of the turning point: Duke Emanuele Filiberto decides to appoint Turin as the new capital of the Duchy of Savoy.
Its trade, banking and early industries all made Torino a rich city in a rich region. It was also a springboard for civil society, for political and economic alliances, and for the early building of railways. From 1847 Turin had become part of the Italian railway network, through the connection with Genoa, followed in 1854 by that with Susa and with Pinerolo; in 1856 the lines for Biella, Savigliano, Saluzzo were built, and then for Novara. Many industrial settlements were born along the railway, in particular in the northern area of the city, due to the greater ease of supply that the railway offered and above all because in that area, thanks to the waterways, there was the possibility of exploiting hydraulic energy.

2.3.2 Industrial Turin

The first phase of industrialization in Turin, at the beginning of the nineteenth century, is characterized by the rise of wool, cotton and silk factories. At the beginning these industries made use of foreign machinery: their constant development prompted the rise of mechanical industries.

"The population increased slowly, in 1881 it had 250,000 inhabitants. The distribution of the trades does not change much: about 10,000 have become mechanical and metallurgical workers, and 50,000 workers in industrial activities in general. But the city is leading the way in many ways. Since 1837 it has been equipped with public gas lighting: it is the first in Italy, the fourth in Europe. In 1896 it was one of the first cities in the world to equip itself with a double sewer system, with a white and a black canalization network. In 1884, at the National Exhibition, the use of electricity for industrial purposes was presented for the first time." [24]
"Italy, by the end of 1901 was already in full industrial growth, with the chemical, metallurgical, and engineering sectors leading the way. Manufacturing production more than doubled, the annual rate of growth reached record highs, and capital investments in plant and equipment rose by 114%, while the relative importance of agriculture in the national economy sharply decreased."[24]
The textile industry was slowly decreasing, the control of the Turin industries were taken over by modern steel, hydroelectric, and machine industries. Many entrepreneurs and new commercial banks helped in rising international economic progress in European countries during 1896-1908. "Turin quickly became one of the main industrial centers in Europe and experienced great economic expansion in

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Le Galès P., (2012), *TURIN Industrialisation and Urbanization Legacy of the past and current dynamics in, Cities and the Urban Experience in Globalizing Times*, Roffo Raphaëlle, Governing the Large Metropolis, Fall Semester 2012
ANNE POWER, (2016), *Torino City Story*, CASEreport 106: May 2016
Britanica, T. Editors of Encyclopedia (2020 April 27), *Turin*, Encyclopedia Britannica
Digital: https://www.britannica.com/place/Turin-Italy
[24] *Biffignandi D., Torino tra Ottocento e Novecento, Museo dell'Automobile di Torino*

Digital: http://www.museoauto.it/website/images/stories/articoli/varie/torino_tra_800_e_900.pdf

numbers of workers, energy consumption, and mechanization of production. Between 1905 and 1911, its industrial population more than doubled, while magazines and factories accounted for one-fifth of all the new constructions in the city."[24]

The engineering sector in Turin experienced the grandest growth, together with the rising automobile industry at the forefront, as this sector saw its workforce expand five-fold in just six years.

By 1911, one third of the city's entire manufacturing population was working for the automobile industry. Moreover, firms in this sector were distinguished by their adoption of the most modern technological and marketing innovations. The Fabbrica Italiana Automobili Torino, or Fiat, was the biggest company that generated new industrial Turin and developed the city into one of the most dynamic enterprises in the country in the decade and a half after its founding in 1899.

"By 1914 Fiat accounted for half of all the car production in Italy, but also controlled affiliated companies that manufactured ball bearings, radiators, marine motors, airplane and diesel engines, railroad cars, trucks, and trams.

Pioneering captains of industry like Agnelli, found powerful political allies in a new generation of municipal authorities who were firmly committed to the goal of transforming Turin into a modern industrial metropolis. Under the administrations of the mayors, Secondo Frola (1903- 1909) and Teofilo Rossi (1909-1915), the city introduced a number of measures designed to reduce the costs of production, increase access to more affordable electrical power, improve the technical qualifications of the labor force, and modernize communications, transportation, and social services." [25]

2.3.3 The Duty Fence 1853

The transfer of the capital first to Florence in 1865, then to Rome in 1871, had its consequences on the social situation and economy of Turin, leaving the city in the search for a new identity.

For Turin, the role of capital city of a regional state had led in the early nineteenth century to a physical and functional urban structure characterized by a strong concentration of activities, investments and of economic and cultural resources.

"The phenomenon of initiation into industrialization was supported by the design of a set of infrastructures and services designed especially as support for production companies. The nineteenth-century public and private tertiary sector took shape with the construction of a vast complex of buildings and public facilities which were also of great importance for the concrete physical definition of the nineteenth-century and current city."[26]

After the decision of the City Council in 1852 to dysfunction the Citadel the plans for urban expansions outside the line of peripheral "military" avenues had been started in 1853 to be transformed into residential areas.

An important indicator of those intentions is the decision taken in 1853 by the Municipality to define the course of the duty fence (cinta danziaria) according to a project with a very extensive perimeter demarcation.

"The customs wall on the left Po was decreed on 1 August 1853, relating to a wall (construction of which was immediately begun) arranged according to a perimeter development that was not equivalent to the centrality of Piazza Castello, but which favored the insertion of the entire production area gravitated around the Dora to the north, the insertion of the sectors of territory arranged along the main routes of Rivoli (corso Francia) to the

[24] *Biffignandi D., Torino tra Ottocento e Novecento, Museo dell'Automobile di Torino*
[25] Cardoza Anthony L., Symcox Geoffrey W.,(2006), *A History of Turin*, Giulio Einaudi editore, Turin
[26] Comoli Mandracci V., (1983), *Le Città nella Storia d'Italia Torino*, Laterza, Roma, Bari, 191-197

west and south, Stupinigi and Nizza (Strada di Moncalieri and Pinerolo)."[27]

"The completion of the wall was foreseen in the Po right with the decree of November 13, 1853 ", delimiting a circumscribed precollinare area, barycentric with respect to the axis of the Napoleonic stone bridge (Ponte Vittorio Emanuele I)." [28]

The shape left by the duty fence in 1853 is still visible today in the structure of the city, in the road structure as well as in the building typology.

The city urban plan differs between the area that was inside the city military wall, that was more rigid and regular than the area of the city outside the military wall.

"The urban development of external area outside the city center , the area of the "barriers" was also regulated, initially and in some sectors, by private subdivisions and only in a second time by the out-of-bounds extension of a sectorial but similar regulation, defined by the decree of the Regulatory Plan for the extension of the main courses and roads outside the Cinta Daziaria - Piano regolatore pel prolungamento dei corsi e vie principali fuori la Cinta Daziaria [...], dated 1887."[29]

"The 1853 customs belt fixed the characters of the radiocentric grid of the city, consolidating the radial layouts of the ancient breakthrough roads: at the first ring of the French system boulevards (current Corso Vittorio Emanuele I, Corso Inghilterra, Corso Principe Eugenio, Corso Regina Margherita, Corso S. Maurizio), in fact was added in the second decade of the twentieth century after the" [30] "abolition (1912) of the duty fence division of 1853 and at the site of the ring road and the boundary wall the road ring constituted by today's Corso Bramante, Lepanto, Pascoli, Ferrucci, Tassoni, Svizzera, Mortara, Vigevano, Novara and Tortona." [31]

The urban expansion of Turin along radial axes grows within the duty fence, in a large ring-shaped strip in the territory between city center and duty fence.

Starting from the twentieth century, the urban growth was supported only by the implementation of sectoral regulatory plans, with the simple principles often with a generic grid of street alignments and with the formation of lots suitable for a standardized construction, without references or structural links with the pre-existing structure, since the settlement processes were completely unrelated to the control of the plan-project, from nineteenth-century town-planning.

"Already at the end of the nineteenth century a correction was attempted with the proposal and approval of the Building Regulatory Plan for the San Paolo region - Piano Regolatore Edilizio per la regione di S.Paolo [...] prepared in 1898 and approved by royal decree in 1901." [32]

The urban planning expansion of Turin was an attempt to create a more regular and functional recomposition of the city with more systematic and central limits than the main city center, also extending manufacturing limits and sectoral regulations to the west.

"The measure was also based on the presence of a clearly decentralized village nucleus far enough from the boundary; an example, if not unique, rare in the ways of the nineteenth-century settlement (with Borgata Vitoria and Regio Parco)." [33]

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[27] Torino, Archivio storico del Comune, (1853), *Decreti Reali 1849-1863*, Serie 1 K, n.11 f.104, 1 August 1853
[28] Ivi, f. 110, 13 of November 1853
[29] Torino, Archivio storico del Comune, (1887), *Decreti Reali 1885-1899*, Serie 1 K, n.13 f.274, 4 of September 1887
[30] Comoli Mandracci V., (1983), *Le Città nella Storia d'Italia Torino*, Laterza, Roma, Bari, p.197
[31] Comoli Mandracci V., (1983), *La capitale per uno stato : Torino, studi di storia urbanistica*, Celid, Torino, p.272
[32] Torino, Archivio storico del Comune, (1901), *Decreti Reali 1899-1911*, Serie 1 K, n.14 f. 19, 31 of March 1901
[33] Comoli Mandracci V., (1983), *Le Città nella Storia d'Italia Torino*, Laterza, Roma, Bari, p. 217

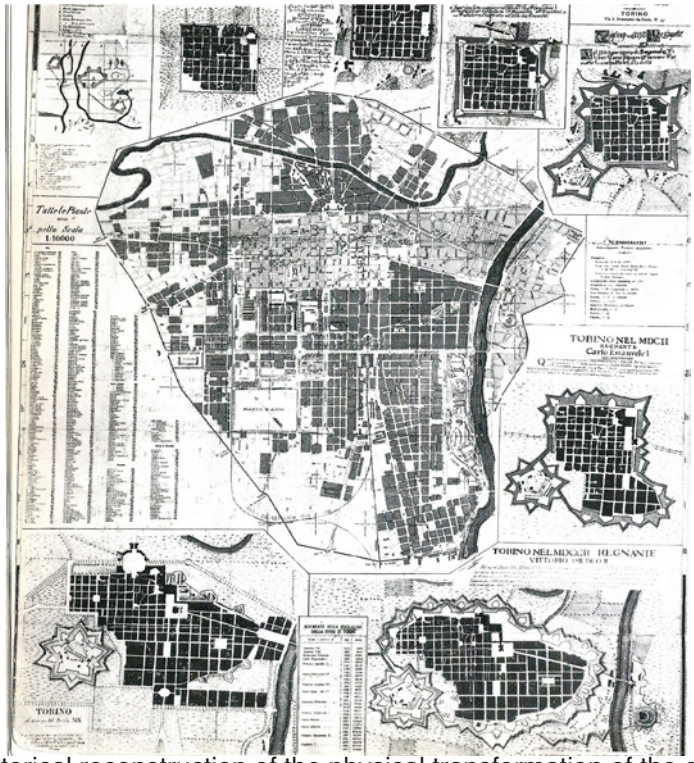

Fig.9 Lithograph with the historical reconstruction of the physical transformation of the city from the pre-Roman period to the end of the nineteenth century, 1892
Source: (TORINO ANTICA E MODERNA <STUDIO TECNICO/ del/ PROF. F. CANEPARO / Geometra / TOPOGRAFO DI S.M. IL RE > - Torino, Archivio storico del Comune, Tipi e Disegni, 64-1-12)

Fig.10 The Chief Engineer Velasco ", out-of-boundary extension of building regulations, 1887. (Master plan for the extension of the main courses and streets around the Turin City Tax Code)
Source: Torino, Archivio storico del Comune, Decreti Reali 1885-1899, serie 1 K, n. 13, f. 274, 4 settembre 1887, di- segno allegato f. 276, stralcio relativo alla parte di disegno).

"The plan was adopted at a time of building fervor in the area, also favored "by the search for workers' homes for the numerous industries that arose in the vicinity at the same time or soon after the construction of the new railway workshops, within and outside the boundary, along the entire western part of the city and for the many means of convenient and rapid communication with the city itself and the other advantages that the worker especially seeks out of "duty"." [34]

The intention of the new sectoral plan was to rationalize the layout of the villages of borgo Campidoglio, barrier of Francia, Cenisia, Monginevro and S. Paolo where private agricultural land was divided into building areas according to casual, not regulated projects of private owners that were attracted to sell the land with higher prices that usually are accounted for in the boundary of the city.

"With the sectoral plan, the manufacturing limit was brought further west to correspond to the route of the current Trapani course, incorporating a vast land already partially settled with residences and productive activities. The localization of large industry (Lancia) in that sector of the territory later consolidated decisive choices for the destination of the "Borgata". " [35]

2.3.4 The Single Regulatory and Enlargement Plan - the 1908 PRG

Over the last two decades of the XX century the phenomenon of intensification of the settlements beyond the duty fence started to intensify, where in the industrial villages the small trade occurred fueled by the workers.

The constructions, especially in the northern sector of the city and in the period still characterized by the dependence of industrial locations on hydraulic power, were also supported by the production sector "for the search that was very lively for cheap land and free from constraints on the part of the manufacturing and construction industry "." [36]

"The urban settlement results corresponding to this expansion process appear clearly displayed, for the area outside the boundary, in the 1911 map relating to the division into hamlets and census sections of the municipal territory (fig.11)." [37]

While inside the duty fance entire areas of land remained undeveloped, a very rapid construction activity had been manifesting itself for some years on the outside of the fence, this phenomenon was due to the fact that the municipality set a duty constraint on the owners.

The new plan was intended as an instrument, if not a rationalizer, at least a composer of abnormal pre-existing structures.

In the first draft of a new regulatory plan of 1906-1908 the task was to recognize the territory, in directions where the industrialization occurred, which was the main mechanism that drives the city economy and society.

The urban planning regulations situation in which Turin found itself at the beginning of industrialization, that had a crucial influence on the city's future, was rather chaotic and not welcoming for industries.

"The building regulations sanctioned by the many Royal Decrees that had followed one another in the second half of the nineteenth century, differentiated by locality, addresses and out of phase time deadlines, complicated the administrative management.

The choice was to establish a single master plan of the city, which was approved by the City Council in 1906 and made executive by law of April 5, 1908, as a Single Regulatory and Extension Plan - Piano Unico Regolatore e d'Ampliamento." [38]

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[34] Ivi, (1906) *Atti municipalli*, Seduta del 24 Ottobre 1906, Atti a stampa, p.1229 sgg.
[35] Comoli Mandracci V., (1983), *Le Città nella Storia d'Italia Torino*, Laterza, Roma, Bari, p. 217-219
[37] Comoli Mandracci V., (1983), *Le Città nella Storia d'Italia Torino*, Laterza, Roma, Bari, p. 219-220
[38] Torino, Archivio storico del Comune, (1908), *Decreti Reali 1899-1911*, Serie 1 K, n.14 f. 53, 5th of April 1908

In fact, it put the city development criteria in place, with a strict adaptation to the manufacturing sector plans that had been defined or started in recent decades on the basis of regulatory impositions referring almost exclusively to the formation of roads and of the property for residential purposes.

The new territorial limits of the plan included a new duty fence ("Cinta Frola". Not executed) and included the settlement areas that were developing outside the duty fence of 1853, leading the building development on the west up to the current Corso Lece and Trapani. In Fact the provision of the expansion of the new duty fence was postponed.

The new project appeared to have a more extensive route, imposing a strong further expansion of the duty fence towards the west ("Cinta Rossi", carried out in 1912-13), near the grounds of the current Corso Brunelleschi and Via Pietro Cossa.
"At the same time, the master plan was extended to the limit of the boundary with the same provisions approved in 1908, authorizing the City "to declare, for the purposes of the duty fance, included in the closed Municipality, all the land circumscribed by the line approved by the Municipal Council of the city itself. , May 3, 1912, and to extend to them, together with all the provisions of this law, the building plan"." [39]

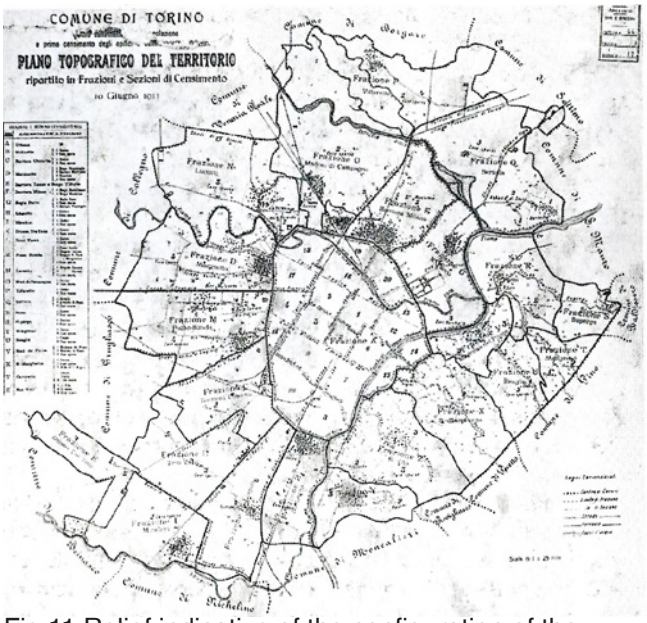

Fig.11 Relief indicative of the configuration of the inhabited area, outside the 1853 duty fence, on the occasion of the 1911 census.
Source: (Torino, Archivio storico del Comune, Tipi e Disegni, 64-8-17)

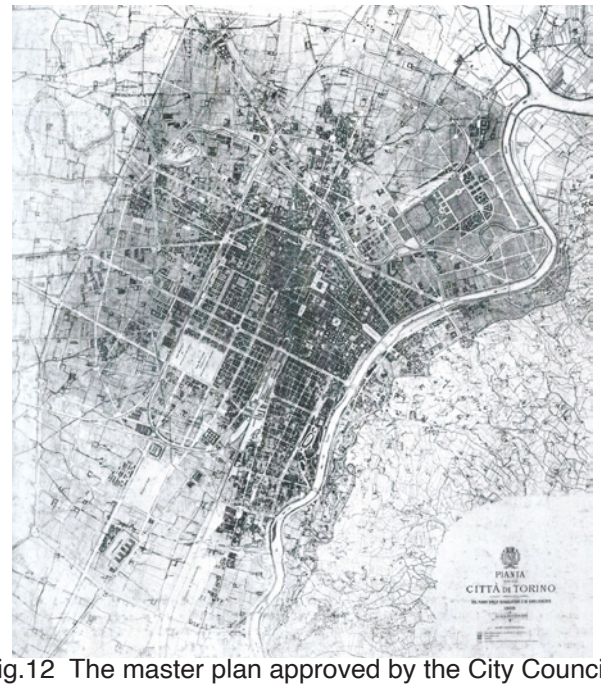

Fig.12 The master plan approved by the City Council in 1906 and made executive by decree law of April 5, 1908.
Source: (PIANTA / DELLA/ CITTÀ DI / TORINO/ COLL'INDICAZIONE / DEL PIANO UNICO REGOLATORE E DI AMPLIAMENTO/1906 'Torino, Archivio storico del Comune, Tipi e Disegni, 64-6-6)

[39] Torino, Archivio storico del Comune, (1912), Piani regolatori. Decreti 1911-1931, Serie 1 K, n.15 f. 5, 23rd of June 1912

The transformation of the prevailing sector from metallurgical to metalworking and the nineteenth-century industrial development were one of the main elements of the city of Turin.
“The reasons for an “industrial” being and becoming were even made to derive in a deterministic sense from the “place”, transposing in the present the reasons, which had previously been authentic, for an ancient localization choice:” [40] “the topographical position of Turin on the plateau limited by the Dora and the Po river, as this position allowed the deduction from the Dora of numerous canals, which supplied the city with an ever greater quantity of hydraulic energy.” [41]
The new electric energy started a radical revolution (in 1884 it was its first appearance at the Valentino Exhibition) for the localization of the industry and the start of car production was on the point of making Turin a specialized industrial center not comparable with similar situations in Europe.
The new industrial phase was characterized by a location of the factories powered by electricity, and abandoned the traditional hydraulic power supply routes, that is, by the system of canals mainly located north of the city.
The new localization of factories led to the formation of new residential settlements and generated the new phenomenon of the formation of opera villages in the city of the early twentieth century.
Such typological outcomes we can notice in Borgo S. Paolo, they are clearly distinguished from the previous settlements immediately outside the duty fence, because they do not derive so much from the administrative and ration management of the city but they are correlatable, with localization of new industrial types fueled by electrical power.
The image that the village of S. Paolo offered in the 1920s was still completely detached from the city, separated from it also by the urbanistic barrier constituted by the service sector of the second half of the nineteenth century.

“The “suburb” was in reality an autonomous decentralized structure, in which social phenomena related to the new situation in which the urban proletariat (and here the word begins to take on an authentic meaning for Turin) began to recognize itself , strengthening problems and perspectives.” [42]

[40] Comoli Mandracci V., (1983), *Le Città nella Storia d’Italia Torino*, Laterza, Roma, Bari, p. 223-224
[41] Gribaudi, *Sui fattori geografici cit.*, p.23
[42] Comoli Mandracci V., (1983), *Le Città nella Storia d’Italia Torino*, Laterza, Roma, Bari, p. 223-224

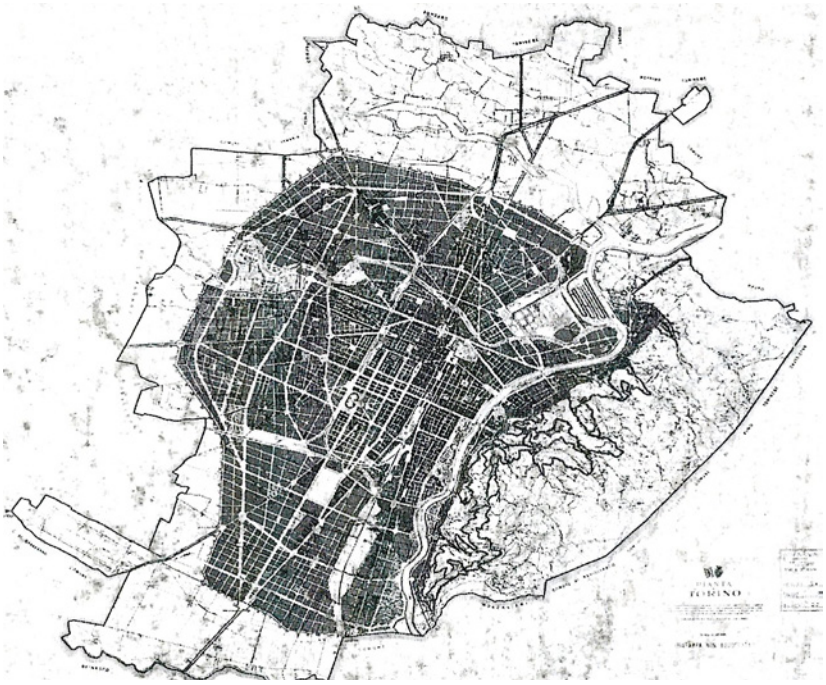

Fig.13 The urban configuration of Turin in 1925
Source: (PIANTA / DI / TORINO/ COLL'INDICAZIONE DEI DUE PIANI REGOLATONI E DI AMPLIAMENTO RISPE) TIVAMENTE/ DELLA ZONA PIANA (vigente per Legge 5 Aprile 1908 e R. Decreto 18 Gennaio 1920) / E DELLA ZONA COLLINARE (vigente per Decreto Luogot. 10 Marzo 1918) AGGIORNATI COLLE / VARIANTI APPROVATE SUCCESSIVAMENTE SINO A MARZO 1925 Torino, Archivio storico- del Comune, Tipi e Disegni, 64-8-22)

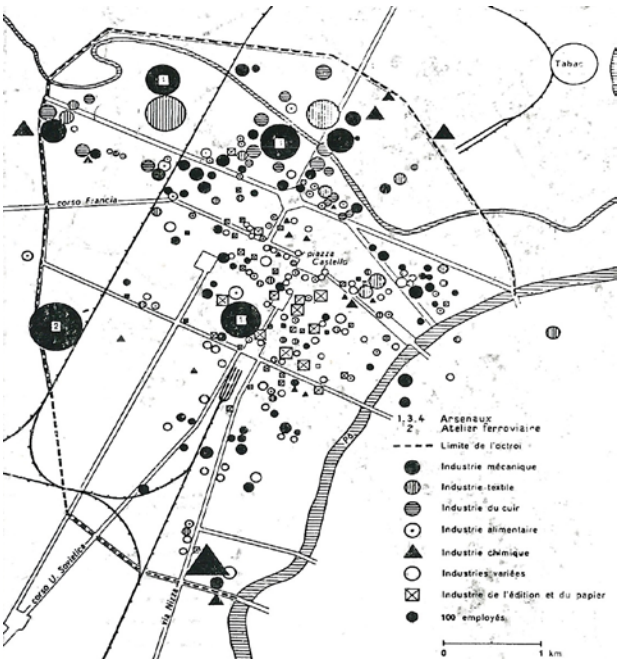

Fig.14 The urban configuration of Turin in 1925
Source: (PIANTA / DI / TORINO/ COLL'INDICAZIONE DEI DUE PIANI REGOLATONI E DI AMPLIAMENTO RISPE) TIVAMENTE/ DELLA ZONA PIANA (vigente per Legge 5 Aprile 1908 e R. Decreto 18 Gennaio 1920) / E DELLA ZONA COLLINARE (vigente per Decreto Luogot. 10 Marzo 1918) AGGIORNATI COLLE / VARIANTI APPROVATE SUCCESSIVAMENTE SINO A MARZO 1925 Torino, Archivio storico- del Comune, Tipi e Disegni, 64-8-22).

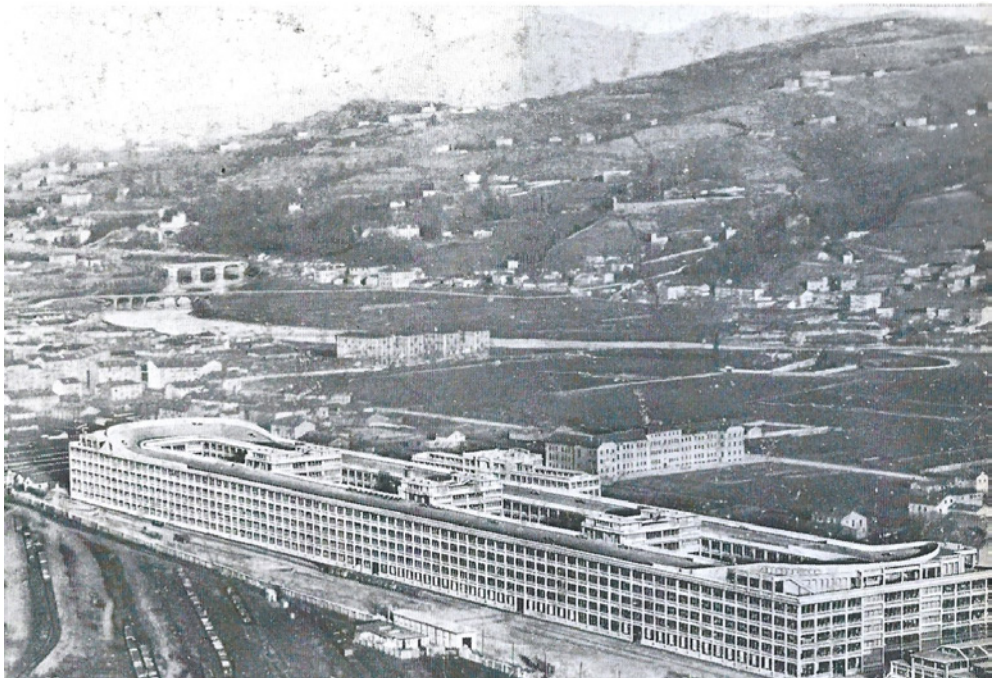

Fig.15 The Fiat Lingotto plant (Giacomo Matté Trucco, 1915-23) on the physical threshold of the sparse southern outskirts of the city
Source: (Torino, Archivio fotografico Centro Storico Fiat)

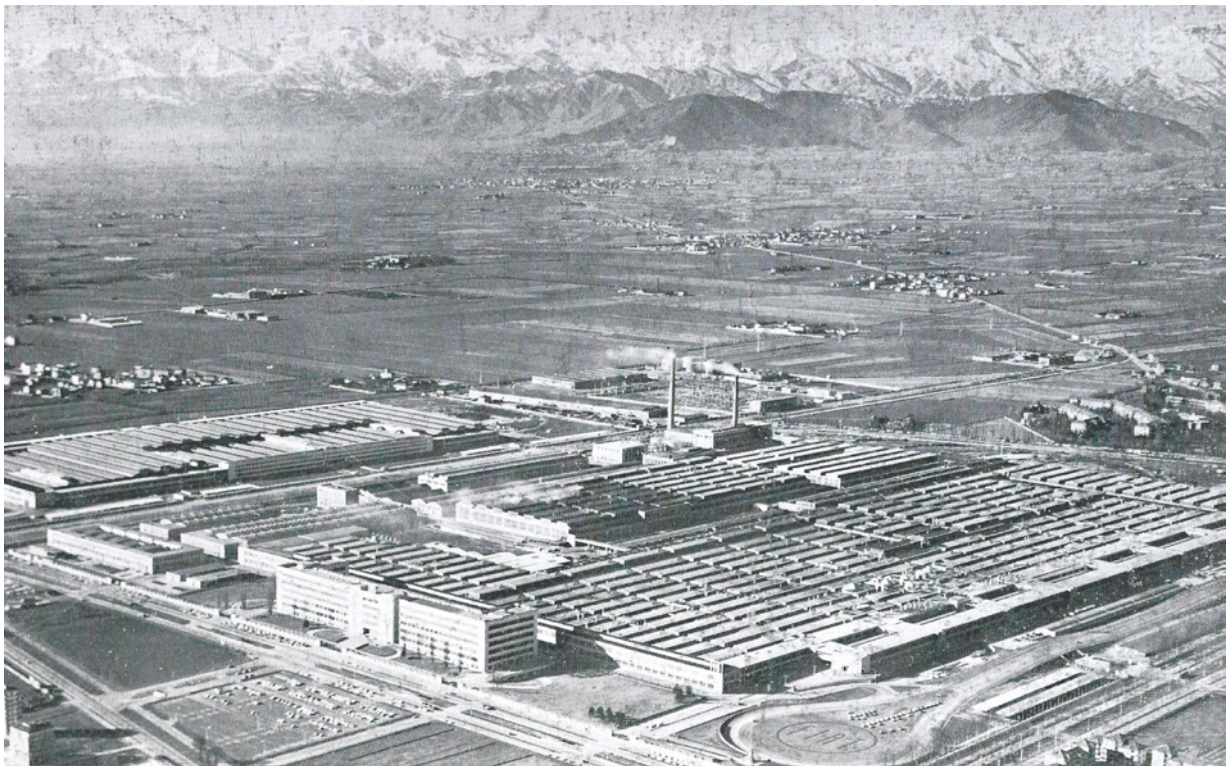

Fig.16 Vittorio Bonadé Bottino, Fiat Technical Department, 1936-39. The Fiat Mirafiori plant under construction (1938) (opposite page) and in 1958 (this page). On the right, Eugenio Mollino's S. Luigi sanatorium hospital, later deactivated and demolished in the industrial and residential expansion of the southern sector of the Turin area and in the municipal area.
Source: (Torino, Archivio fotografico Centro Storico Fiat)

2.3.5 Turin during Wars

The settling of the car industry was due to war orders, which had led to a very strong increase in the presence of workers in the city; the inhabitants were. rose from 415,667 in 1911 to 499,823 in 1921. The rate of increase gives the measure of the rapid incisive demographic centralization assumed by the city.

The first part of the 1920s, before the economic crisis exacerbated its pressures, was characterized in the field of architecture and interventions in the area by some emerging industrial phenomena: the Fiat Lingotto (designed as early as 1915 by Giacomo Matté -T'rucco) in the southern sector of the city, deciding on a direction of location choice that will be successful and will then be definitively consolidated. from Fiat Mirafiori (moved, but in the same southern sector); the formation of the industrialized sector in the north; towards Milan, supported by the choices made by the Gualino group with the formation, in particular, of Snia-Viscosa at Abbadia di Stura and Venaria Reale.

"The very large territory, made urbanizable by the regulatory plan of 1908 and by the displacement of the customs belt (1912) provided for a hyperbolically growing population increase." [43] "It is enough to remember critically noted Pietro Betta in 1929 - (.] That in Turin a few years ago some people expected to reach almost two million inhabitants in 70 years." [44]

2.2.6 Economic Boom 1950 - 1980 in Turin

"In fifteen years, between the 1950s and 1960s, the population of Turin increased by fifty percent and the population of what was called its first duty fence, in the process of rapid "conturbanization", increased by one hundred percent, the "engine" of this development was the automotive industry, Fiat that applied the taylorist organization of work and formulated the strategy of "Motorizing" Italian population and designed, car models suitable for the formulated strategy. The rapid growth of Fiat dragged the rapid growth of the industries that produced semi-finished products for Fiat and, together, activated a "chain" of goods and services for the rapidly growing population."[45]

The growth of industries developed huge amounts of job opportunities and resulted in massive migration waves to Turin from the rest of the Piemonte region and mainly from south of Italy.

"Hence emigration, both towards the industrialized countries of Europe and towards the "industrial triangle of Italy" namely Turin, Milan and Genoa."[45]

The city of Turin was not prepared for sudden population growth and in the result the massive migration to the city resulted in some problems. The first problem was connected to the lack of sufficient housing and infrastructure which led to creation of slums neighborhoods. The second problem that arises was strictly connected to the first one where the lack of space and massive migration created the social conflicts and tension between the original population of Turin and immigrants.

"The social and spatial structure of Turin has undergone from the post-war period intense transformations that have occurred in very

[43] Comoli Mandracci V., (1983), *Le Città nella Storia d'Italia Torino*, Laterza, Roma, Bari, p. 228-231

[44] Betta P.,(1927), "*Problemi storico-urbanistici della Città di Torino, in «Torino, Rassegna Mensile*, Torino 1930, giugno, pp. 467-91; qui 486. Il saggio, corrispondente ad una conferenza presso il Sindacato do pubblicato con Armando Melis de Villa, Torino qual'è e quale sara, Casanova, Torino

[45] Davico L., Detragiache A., Mela A., (1997) *Torino : mobilità residenziale e struttura urbana dal boom economico agli anni '90*, Celid, Torino

concentrated times.
In fact, it has suffered in a rapid and amplified form both the consequences of the development of a Fordist-type industrial model as well as those of the subsequent phase of deindustrialization and post-industrial transition, made more acute precisely by the absence of a diversified economic base. These consequences have affected, and affect, all aspects of the urban and metropolitan system: from its economic base, to its political and cultural activity, up to the physical shape of the city and its social geography."[46]
The evolution of the economic system and the characteristics of the urbanization processes in Turin and strongly correlated.
In Turin urban development we can distinguish some phases corresponding to the "long waves" of industrial development that were introduced by Davico L., Detragiache A., Mela A., in book Torino : mobilità residenziale e struttura urbana dal boom economico agli anni '90. They describe 4 main waves in urban development of Turin:

- The first wave of growth developed in the first half of the nineteenth century. In this phase the social and economic role of Turin was growing and some conditions for subsequent industrialization were created. There was an increase in the population from 1800 to 1830 (when Turin reached 122,424 inhabitants) and a slight contraction in the following 15 years (in 1845 it had 121,405 inhabitants).
- The second wave of growth developed in the second half of the nineteenth century. After the Italian unification, there was a period of economic crisis and a slowdown in the city's demographic growth due to extra-economic reasons (the transfer of the capital in 1865), but shortly later, the moment of industrial take-off begins and the increase in population resumed vigorously especially in the years from 1881 to 1991.
- The third wave developed in the first half of the twentieth century, and is linked to metallurgical and mechanical development and electrification, which allows industrial development and its expansion even in the villages outside the customs belt. The urban growth rate was high until the 1930s; then it stopped due to the upheavals of the Second World War.
- The fourth phase starts from the beginning of the 1950s to the 1990 and was divided by the authors in two phases :

1. growth based on patterns of economic and spatial polarization up to the mid-1970s
2. phase characterized by a tendency towards the deconcentration of economic activities and deurbanization.

"Between 1951 and 1971 the urbanized area of Turin passed from 40 sq km (corresponding to 31% of the municipal area) to 60 kmg (46%). In the following decades, the process continues in a slower form. As a consequence of these processes, in 1991 the density of the municipality of Turin was 7393 inhabitants / sq km; that of the entire metropolitan area of 1283 inhabitants / sq. km."[46]

Based on the analysis of the census data from 1951-1981 carried out by Morbelli (1987) and based on the division of the city into 6 sectors the variation of population can be distinguish as follows:

- the center, corresponding to the old walled city of the seventeenth-eighteenth century;
- the semi-center, which has its external borders in the customs belt of 1853;
- the three main sectors of the periphery: northern, western, southern;
- the hilly area east of the city

[46] Davico L., Detragiache A., Mela A., (1997) *Torino : mobilità residenziale e struttura urbana dal boom economico agli anni '90*, Celid, Torino

In the 1950s, the increase in population derived almost exclusively from the migratory balance.

"Between 1952 and 1962 the migratory balance was equal to 367,000 people; the immigrants were in total 562,000, the emigrants 195,000; in December 1962 Turin reached 1,079,000 inhabitants: in ten years the population was therefore renewed for more than half. 37.2% of the 562,000 immigrants came from Piedmont, 18.6% from the remaining regions of northern Italy, 4.8% from central Italy, 34.8% from southern and island regions, 4.6% from abroad or from an undetermined location. In the second half of the 1950s the weight of immigration from the South had grown, gradually assuming pre-eminence: in 1962, 45.2% of immigrants arrived from the South and the islands, against 27.5% from Piedmont, 3% from northern Italy, 6.2% from central Italy, 4.7% from abroad and location not determined."[47]

In most northern cities as well as in Turin and its metropolitan area a strong mobility of the population was recorded.

"In the years of strong industrial growth, Piedmont recorded strong migratory balances. The annual average of the Piedmontese migratory balance was 11.8% in the period of 1962-65 and was second only to that of Liguria, among all Italian regions. While overall mobility slightly decreased between 1972 and 1975, Piedmont region is, among the Italian regions, that had the highest inter-regional mobility rates. Between 1978 and 1990 this rate remained constant above 5% and in many cases exceeded 6%. The intense urban growth processes that took place during the years of the economic boom were accompanied by a strong growth in mobility inside and outside the city." [47]

When we talk about industrial Turin of the years 1945-1970, the Fiat factory was the center of the production world consisting of its numerous and vast factories scattered throughout the city, around which the many associated companies, small and medium-sized, many of which had a direct relationship with the transport sector.

"In addition to this, it was evident that Turin had become essentially a city for the factory, as a place of residence and life for workers, employees and managers, as well as a management, commercial and service sorting center capable of meeting the needs of industrial apparatus as a whole."[48]

Many activities and services in Turin started to be dependent on the industry sector despite the fact that they were not related. Industry mostly took away the weight and autonomy of these sectors.The location of industrial plants in the city of Turin was strongly connected to the policies and stratifications of the city. The first industrialisation of the early 1900s was conditioned by the layout of the new customs belt and by the need to easily access substantial water resources.

"It also counted the legacy of decades of dominance of large industry, moved in the choice of places to build the plants for reasons of internal efficiency, the availability of areas at favorable prices or exceptional projects, such as the one for the Mirafiori plant, with unusual dimensions. already at the time of its construction in the second half of the 1930s and even more at the time of its expansion after the war. All this resulted in a strong concentration that not even the expansion of the first belt around Turin towards the municipalities would have helped to lighten."[48]

Together with the industrialization the rapid increase in population occurred and the construction of houses for the whole period was significantly behind the needs of a growing

[47] Davico L., Detragiache A., Mela A., (1997) *Torino : mobilità residenziale e struttura urbana dal boom economico agli anni '90*, Celid, Torino
[48] Levi F., (2002), *La città e lo sviluppo : crescita e disordine a Torino 1945-1970 / a cura di Fabio Levi e Bruno Maida*, Angeli, Milano, 2002

population. New neighborhoods appeared in the extreme periphery, together with lack of proper housing the services, even essential ones, remained insufficient.
"The urban disorder had particular repercussions on the transport system: substantial masses of travelers were tossed twice a day from one part of the city to the other without an effective effort being made to improve the public service. For its part, the municipal administration discussed for a long time and finally succeeded, after more than ten years, in approving the master plan, which however came when a building development without rules had already largely shaped the territorial structure."[49]
The new master plan did not solve the issue related to the relationship between industry and the city by conditioning in some way the location of the plants, however it managed to avoid the destruction of some parts of the city as hills. "The Master Plan, in its effort to harmonize the new with the existing, it did not provide for the dismantling and replacement of industrial plants that were not obsolete by decision of their owners; moreover, the growth hypotheses of the city on which it was based completely disregarded where and how the plants that would have been predictably at the origin of that growth would be located. It is significant that, pending the effective promulgation of the Plan, Fiat requested and obtained a series of variants intended to facilitate the restructuring of its production system."[50]

The poor housing conditions and lack of services that most of the immigrants, especially from south of Italy, were facing were becoming evident.
"The city, moreover, was running out of reception spaces. Between 1961 and 1971 the population only increased by 13.9%. After the relative stagnation of 1964-66, in connection with the brief but intense negative economic situation, immigration resumed at a good pace but in a situation in which the primacy of new arrivals fell to the municipalities of the first and second duty fence. After passing from 269,000 inhabitants in 1951 to 354,300 in 1961, Turin's population almost doubled between 1961 and 1971, the year in which they reached 632,000 inhabitants."[47]

TAB. 1 SERIE STORICA DELLA POPOLAZIONE DI TORINO (DATI CENSUARI)

1861	204.715
1871	212.644
1881	252.832
1891*	329.724
1901	335.656
1911	427.106
1921	502.274
1931	597.260
1941*	716.261

* dati anagrafici (censimento non effettuato).

Fig.17 Historical series of the population of Turin (census data)
Source: Davico L., Detragiache A., Mela A., (1997) *Torino : mobilità residenziale e struttura urbana dal boom economico agli anni '90*, Celid, Torino

"Turin would have reached its maximum number of residents in 1974, with 1,200,000 inhabitants, and then, in connection with the processes of industrial restructuring and productive decentralization, encountered a progressive, slow loss of inhabitants."[50]
The high number of immigrants arriving to Turin were mainly the immigrants from south of Italy. These migration waves also significantly changed the composition of the population resident by place of birth.
"At the 1971 census 34% of the inhabitants were born in Turin; from the rest of Piedmont only 20.7% came; 10.1% from the remaining Northern regions; 5.1% from the Center; 2.9% were born abroad; more than a quarter of the

[49] Novelli D.,(1994) *Gli anni di piombo, in Storia illustrata di Torino, a cura di V. Castronovo*, vol. VIII, Sellino, Milano
[50] Levi F., (2002), *La città e lo sviluppo : crescita e disordine a Torino 1945-1970 / a cura di Fabio Levi e Bruno Maida*, Angeli, Milano, 2002
[51] Si vedano i dati in Città di Torino - Assessorato all'urbanistica, Torino e i comuni della prima e seconda cintura. Analisi della situazione dei servizi pubblici, Torino, s.d. (ma 1974)

population was born in the South (27.1%), not to mention that by now there were not a few young people born in Turin to immigrant parents." [51]

Between 1962 and 1973 The population increase was no longer related to the imigration waves but also the birth rate.

"The birth rate had brought the proportion of live births per thousand inhabitants of 16-17% or, equal to those of the first decade of the 1900s; this is true of a centuries-old tendency to decrease in the birth rate which had v shrink to 8-10% between the end of the 40s and the early 50s. While at the beginning of the century the number of live births was roughly equal with that of deaths, in 50s the decrease in the mortality rate gave for the first time a significant positive natural demographic balance, which in the period of maximum birth rate, precisely 1962-73, was equal to an annual average of 6.25%. Subsequently, between 1974 and 1977, there was a new decrease in the birth rate, which returned to the levels of the second half of the 1950s, and then collapsed, at the end of the 1970s and in the 1980s, below of the mortality rate, as it had already happened as a result of the two world wars and the great crisis of 1930-34." [51]

"The temporary resumption of the birth rate in Turin cannot be explained only by the baby boom which in the years of the favorable economic cycle affected the whole Western world. In Italy, in fact, the recovery of the birth rate was modest and limited to the five-year period 1962-67."[52]

"In Turin, however, it was of considerable size and continued until the early 1970s. In the absence of adequate statistical elaborations, the most convincing hypothesis of explanation identifies in the cultural heritage of southern immigrants the main factor in the rise in the birth rate." [51]

[51] Davico L., Detragiache A., Mela A., (1997) *Torino : mobilità residenziale e struttura urbana dal boom economico agli anni '90*, Celid, Torino
[52] Livi Bacci M., (1989) *Storia minima della popolazione del mondo*, Loescher, Torino, 1989

SUMMARY

Łódź was the empire of the cotton industry while Turin was the automobile one. When the Kingdom of Poland became a part of the Russian Empire, the industrial market of Łódź was exporting all its goods to the west while Turin became one of the main industrial centers in Europe.

The industrialization shaped both of the cities Turin and Łódź and in both cases it strongly influenced the urban structure of the cities that we can see now. Although both cities had their differences in urban development and history, as in the case of Łódź the industrialization was the main principle that built the core and current structure of the city, it was the main factor that caused the expansion of the city. The city of Łódź was made by factories and industrial districts, the city did not exist before the industrial revolution and the city planning of it was not controlled. The city structure was made by different urban grids joined together by means of streets and squares. Different industrial zones were spread along the city joined by main streets. While Łódź was a rising city during the industrial revolution, Turin was already a splendid city with its rich history and culture with an urbanized central part of the city. The beginnings of Turin date back to 218 BC while in the 1820s Łódź was starting its expansion and development, Turin had already fully developed the city center with great medieval, renaissance and baroque architecture.

Both cities experienced great urban development during the industrialization era. The urban development of the city of Łódź, due to the fact that it did not exist before the industrial revolution as a city, was very spontaneous and chaotic. Opposite happened in Turin where the city regulations forced urban development to expand within the duty fence in a large ring-shaped strip in the territory between the historical city center and the duty fence. Due to financial reasons many industrial sites developed beyond the first duty fence. This led to creation of the Single Regulatory and Enlargement Plan - the 1908 PRG that enlarged the territory of the first duty fence to include all the industrialized areas.

After the wars the city of Turin and Łódź (that remained untouched during war unlike other cities of Poland) continued their industrial growth and expansion of industrial territories.

In the 50-80's Turin faced a so-called economic BOOM and witnessed significant growth in population. Most of the immigrants coming to Turin arrived from the south of Italy in order to find jobs in the rapidly growing industrial sector in Turin. The rapid population flow to the city caused many problems in the urban sector where Turin faced lack of sufficient housing and services which led also to social division and creation of slums in the city.

In the case of Łódź, after the war, the city faced great cultural growth. As one of the few cities, Łódź was not damaged during war which resulted in high migration flows towards the city to find shelter. A lot of intellectuals, artists and aristocrats were among the immigrants. Parallel to the industrial development, the city of Łódź focused its development on the cultural aspects, resulting in development of universities such as National Film Academy, Academy of Fine Arts, University of Technology or University of Łódź but also theaters, cinemas, galleries and a lot of social spaces.

3

DEINDUSTRIALIZATION AND PROCESS OF REVITALIZATION OF BROWNFIELD AREAS

ŁÓDŹ

3.1.1 Deindustrialization in Łódź 1989-1994

At the turn of the 1980s and 1990s, the process of political and economic transformation in Poland took place. The transition from a centrally planned economy to a free market economy had far-reaching consequences for the Łódź textile monoculture, whose existence from 1945 was based mainly on the export of finished products to the Soviet Union.

After 1989 state socialism in Poland ended as a result a new government was formed by members of Solidarity.
This change had a direct impact on the development of Łódź, factories were reformed or closed and their employees dismissed or included into new managerial relationships. In Łódź each year the economic condition was getting worse as more and more factories ceased their operations and fired workers.

As a result of the loss of the eastern market, the Łódź textile industry was rapidly subject to recession, until it finally collapsed in the 1990s. The former industrial facilities occupying a large part of the city center area in Łódź were abandoned and degraded. Some of them were demolished, while others were leased by smaller service or production plants.

The urban space and the population inhabiting Łódź were equally marked by the intransigent legacy of the industrial city. Not only did it make the transformation harder, but also cast the urban space in a way even less acceptable in the new reality, no longer appreciative of industrial production but rather the service economy and the creative sector. Urban chaos and the struggle with the label of the "bad city," were an issue again.

3.1.2 The beginning of the process of revitalization of Łódź

After the transitory period where no projects could emerge because of disorientation and a lack of funds, Łódź could finally start the revitalization of post-industrial city.
"Urban regeneration projects emerged concerning the transformation of the city center. One was the renovation of the city's main passage, Piotrkowska Street." [1]
The idea of the reconstruction of Łódź's main street was carried out in 1990. The aim was not only the refurbishment of the main street but also the wide transformation of its function.
"Piotr Biliński, the official architect of the city, admitted that this redevelopment "was a great problem." However, he firmly insisted that it should be pedestrianized, and customers of the local shops transported by tram." [2]
Renovation started in 1992 and finished in 1997, the northern part of Piotrkowska Street, located between Plac Wolności and avenues Mickiewicza and Piłsudskiego, was modernized, transforming it into a representative pedestrian and wheeled route. It housed the most prestigious shops in the city, numerous restaurants, pubs and nightclubs, making it a place where the city's social life was concentrated during the day and at night, especially on weekends. Due to the location of many of the most valuable monuments in Łódź, Piotrkowska Street was considered the city's landmark, recognized in all Poland as the main tourist attraction of Łódź. The linear form of the central space of Łódź remained at the beginning of the 21st century enriched with a new morphological and functional element in the form of a shopping mall ("Galeria Łódzka") located in the former industrial area at the intersection of Sienkiewicza Street and Piłsudskiego Avenue.

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[1] Zysiak A., (2019) *From cotton and smoke : Łódź industrial city and discourses of asynchronous modernity*, 1897–1994, Kraków, Jagiellonian University Press, p:247
[2] "Lepiej później, ale porządniej," Głos poranny, nr.177, 1990

Fig.18 Distribution of industrial and brownfield areas in relation to morphogenetic units in the city center of Łódź (1999)
Source: (prepared by KAZIMIERCZAK J., (2014), Wpływ rewitalizacji terenów poprzemysłowych na organizację przestrzeni centralnej w Manchesterze, Lyonie i Łodzi, p.191)

3.1.3 The process of revitalization of post-industrial facilities in Łódź

The process of revitalizing post-industrial facilities in Łódź for new purposes began in the second half of the 20th century with the adaptation of the former Ludwik Geyer factory into the Central Museum of Textiles in 1956. Activities of this type in post-industrial areas were carried out sporadically. The revitalization of Łódź's post-industrial facilities accelerated in the first decade of the 21st century.

"Due to the significant fragmentation of post-industrial areas and their dispersion in the downtown area, the process of spatial and functional transformations was still enclave-like. Investments in post-industrial areas were not supported by remedial measures implemented in the neighboring areas. As a result, the renovated buildings, mainly for office purposes and characterized by an interesting physiognomy, constituted "islands" among the degraded downtown buildings." [3]

The first decade of the 21st century was associated with the revitalization activities in the two largest post-industrial complexes in the city center of Łódź, located at the poles of Piotrkowska Street.

The first is the former factory complex belonging to Karol Scheibler, located in the valley of the Jasień River in the central part of the water and factory estates.

As a result of the adaptation process, the post-industrial facilities of the complex were turned into a residential function. The investment called "U Scheiblera" (due to the original owner of the jurydyka) also included the creation of new residential buildings, which supplemented the post-industrial material substance of the historic complex. On the other hand, the part that was occupied by the former workers of Księży Młyn, were not transformed, which the city authorities included in a separate revitalization project, assuming the development of cultural functions in this area. As part of the project, the estate included, among others, the Design Institute of the Academy of Fine Arts.

Currently, buildings belonging to the Scheibler empire perform a variety of functions. In the factory's palace there is the Museum of Cinematography, the revitalized walls of the former spinning mill are occupied by Loft Aparts, numerous restaurants and flats. The workers' housing estate is undergoing renovation, but it is still used as housing.

Among the few investments undertaken in the first decade of the 21st century was the construction of closed housing estates (including "Barciński Park") in the quarter of streets - Tymienieckiego, Kilińskiego, Abramowskiego, Sienkiewicza.

South of Tymienieckiego Street in the western part of the Scheibler family factory complex, in 2012 the construction of the "Art-Incubator" began. The former post-industrial buildings, which retained their physiognomy, became the seats of various types of organizations, associations and cultural, educational and social foundations promoting the development of entrepreneurship related to culture and art in Łódź. The complex houses a festival center and art studios, an art gallery, and office buildings intended mainly for young artists and entrepreneurs.

The second largest post-industrial complex in the city center of Łódź, which underwent repair processes in the first decade of the 21st century was the factory complex of Izrael Poznański. It is situated in the Łódka River valley north-west of Nowe Miasto.

"In the 19th century, Izrael Poznanski factory was one of the biggest textile enterprises in the Russian Empire. Throughout the years of state socialism (under a different name) the

[3] Kazimierczak J., (2014), *Wpływ rewitalizacji terenów poprzemysłowych na organizację przestrzeni centralnej w Manchesterze, Lyonie i Łodzi,* Wydawnictwo Uniwersytetu Łódzkiego, Łódź, p.179-225

plant had employed thousands of women and men. After 1989 production declined and the factory hovered on the verge of bankruptcy. A huge stretch of industrial land covered with impressive buildings standing in the heart of the city awaited a new function. It could easily have been sold for real estate redevelopment; and then it would have just vanished." [4]

As a result of spatial and functional transformations, in 2006 a new shopping, entertainment and cultural center was opened in Łódź. In the so-called "Manufaktura '' includes, among others a shopping mall, numerous gastronomic facilities, a cinema, a theater, a disco and the first four-star hotel in Łódź - the andel's Hotel.
As part of the complex also includes two museums - the Factory Museum, presenting the history of the Łódź textile industry and the factory complex built by the Poznański family, and a branch of the Art Museum in Łódź, "ms2", which houses world-class works of contemporary art.
As a result of the revitalization of the complex of post-industrial quarters limited by Ogrodowa, Zachodnia, Drewnowska and Karskiego Streets, the central space in Łódź, associated mainly with Piotrkowska Street and to a lesser extent with Galeria Łódzka, has been enriched with a new morphological element.
The arrangement of the central space, developed in this way, consists of three enclaves that are not spatially integrated. The construction of a large shopping center in "Manufaktura" with an aesthetically and physiognomically attractive public space, which definitely stands out from the neglected downtown district, and the creation of "Galeria Łódzka", which is a centripetal, commercial public space, reduced the rank of Piotrkowska Street as the main shopping street.

The most intense morphological changes included a change in the length of streets and roads, a change in the length of railway lines and the size of the area of new buildings erected as part of revitalization. The preserved post-industrial development has been fully adapted to the needs of new service activities, mainly cultural and entertainment activities. The new facilities, on the other hand, were intended for trade, including large-scale ones.
Most of the post-industrial areas in the western part of the former water and factory estates of the Łódka settlement were considered as brownfield areas until 2014.
Due to the functional program, it is the only currently implemented investment on water and factory estates, which creates an opportunity to expand the modern central space in Łódź. This state of affairs is also significantly influenced by the morphology of the complex and the immediate vicinity of Piotrkowska Street.
Nevertheless, according to the Simplified Local Revitalization Program selected downtown and post-industrial areas of Łódź for the years 2004–2013 - Uproszczony Lokalny Program Rewitalizacji wybranych terenów śródmiejskich i oraz pofabrycznych Łodzi na lata 2004–2013 (LPR for short) had a water and factory located significantly outside the "service city center". In order to integrate the revitalized post-industrial areas as a potential new central space, efforts should be made to shape new metropolitan functions between these two areas.

[4] Zysiak A., (2019) *From cotton and smoke : Łódź industrial city and discourses of asynchronous modernity, 1897–1994*, Kraków, Jagiellonian University Press, p:247

3.1.4 Simplified Local Revitalization Program selected downtown and post-industrial areas of Łódź for the years 2004–2013

The local revitalization program covered a large fragment of the city central area in the borders of the percussion railways.
A simplified local revitalization program for selected downtown and post-industrial areas of Łódź for the years 2004–2013 was adopted by a resolution of the city council in 2004.
As early as 2004, the factors hindering the development of Łódź were the mismatch of the spatial structure and the technical death of residential and post-industrial buildings, traces of which are still visible in many places in the center of Łódź.
The local revitalization program (LPR) was treated as a tool for the implementation of the 20+ strategy. The LPR, still being modified and consulted with the city's inhabitants, assumed that revitalization processes would be concentrated in the metropolitan area, which is in line with the general trend of revitalizing Łódź. The zone was recognized as a crisis area, subject to destructive spatial, social and economic processes.
In the chapter on the assumptions of LPR, entitled State of development and cultural heritage, the results of the analysis of the technical condition of facilities located within the zone are presented. The scale of the problem is illustrated by the fact that 90% of the buildings are in a bad technical condition (50% -70% of consumption and over 70%). The analysis does not separate the issue of historic real estate, however, all revitalization activities undertaken as planned are to be carried out with respect to the historic fabric of the city226. The LPR ceased to apply when the municipal revitalization program was adopted, i.e. in 2016.

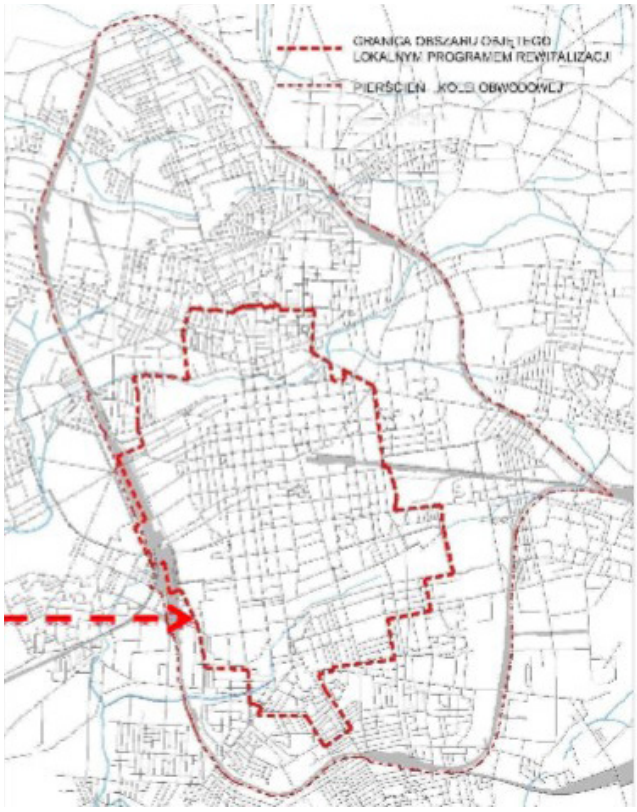

Fig.19 the area covered by the local revitalization plan
Source: Simplified Local Revitalization Program selected downtown and post-industrial areas of Łódź for the years 2004–2013

3.1.5 The municipal revitalization program for the city of Łódź (GPRŁ) Gminny program rewitalizacji miasta Łodzi

The municipal revitalization program for the city of Łódź (GPRŁ) was adopted by the city council on February 10, 2016. The revitalization area designated by the resolution constitutes 6.08% of the total area of the city, and its borders go beyond the metropolitan area known from other strategic documents. The program assumptions of the GPR took into account the cultural capital of Łódź, however, the main tasks related to the protection of monuments were assigned to the Municipal Program for the Care of Monuments of the City of Łódź (GPOnZŁ), in which tasks and

goals related to the revitalization of monuments remaining within the boundaries of the metropolitan area were set. The vision of GPRŁ is friendly, creative and a dynamic city of sustainable development with competitive living, working and investment conditions, using the historical, infrastructural and creative potential, and its mission - liberating the potential of the center of Łódź and its inhabitants. During the development of the GPRŁ, the local possibilities of the revitalization area were analyzed. The multicultural landscape of the industrial city and the legacy of the avant-garde in Łódź, which is conducive to the development of creative initiatives, both cultural and industrial, have been recognized as the potential of cultural heritage.
The uniqueness of Łódź's heritage has been recognized as one of the key opportunities for the city's development. The source of economic potential are historic post-industrial facilities, which, according to the assumptions, should be used for the organization of services requiring large-area facilities, therefore conclusion No. 30 deals with the allocation of such real estate for office, production, commercial or service purposes.
A new solution, in terms of the conservation doctrine, is to bring out the city's attractiveness through a bold and creative dialogue with history - as a result of abandoning the reconstruction of the 19th-century city, focusing on diversifying the space (meeting the needs of residents) and placing new buildings in the historical context.

The revitalization program was based on four strategic goals:

1. Achieving social cohesion
2. Change in the image of the city and its center - in the field of revitalization of monuments, attention was paid to the need for: special protection of the historical buildings of the city, filling the defects in the tenement houses and gradual
3. Stimulating local entrepreneurship
4. Revitalization of the area of residence in relation to the revitalization of mon uments, attention was paid to the need to improve the technical condition of the facilities. There are 101 revi talization projects planned in GPRŁ, in cluding 20 area revitalization projects in the center of Łódź; Eight of them were identified as priorities

The municipal revitalization program for the city of Łódź (GPRŁ) from 2016 was changed in 2018 and once again in 2020 with the attachment of the resolution Revitalization Program of Łódź 2026+ - Municipal Revitalization Program.

3.1.6 Revitalization Program of Łódź 2026+ - Municipal Revitalization Program

The Municipal Revitalization Program (GPR) is the basic document adopted by the municipality that enables comprehensive revitalization activities in a designated area with the participation of the local community.
The foundation of the Commune Revitalization Program is a detailed diagnosis of the revitalization area, which shows the negative social, economic, spatial and functional phenomena occurring there.
The USAR Team determines, on the basis of the results of the diagnosis, the objectives of revitalization and the directions of activities through which the indicated area is to be brought out of the crisis it is currently in.
It also contains a description of projects that will be implemented in the area of revitalization.

The revitalization area covers the entire area of Śródmieście and parts of: Bałuty, Widzew, Górna, Polesie, and extends beyond the boundaries of the metropolitan zone. It is heterogeneous both in terms of the functions performed, crisis phenomena and potentials.
The area of the area is 1783 ha, which is 6.08% of the total area of Łódź. At the time of delimiting the area, it was inhabited by 152 292 people, which constituted 22.83% of the population. The area is therefore within the area and population limits set by the law.

The Revitalization Program of Łódź 2026+ is strongly connected with the Municipal Program of the Preservation of Monuments were one of the main principles are:

- Strategic goal Renewal of the area of the municipal zone, currently covered by destructive processes spatial, social and economic. Historic areas and historic buildings located predominantly in poor condition, should be rescued for the sake of preserving identity and respect for the cultural heritage of Łódź.
- Operational objective I Preservation and protection of the historic structure of the City and historic buildings
- Operational objective II Education and promotion of cultural heritage aimed at increasing the awareness of its importance and building local identity
- Operational objective III. Active, integrated management of the cultural heritage of the City

The planning part of the revitalization program is a response to the results of the diagnosis. However, it is not a passive response: in many aspects it is not limited to what automatically results from the diagnosis of problems, but - based on the diagnosed potential - meets the challenges by taking preventive measures and anticipating the emergence of problems that may be foreseen in the future. This program therefore has as its source - in addition to being based on diagnosis - a vision that is anchored in the future.

The starting point for the development of this vision was the vision contained in the document “Local Revitalization Program for Łódź 2020+. ASSUMPTIONS “, which did not formulate the goals of revitalization, but the first version of the vision of the state after the successful completion of revitalization was defined. This vision has been significantly developed and detailed in this Program.

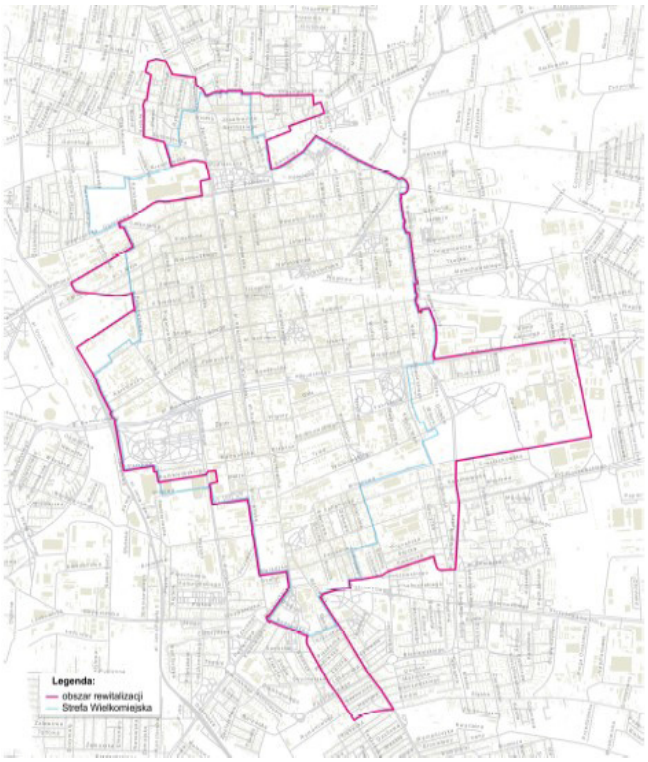

Fig.20 Revitalization area for Łódź and the boundaries of the metropolitan zone

TURIN

3.2.1 Deindustrialization in Turin

During the twentieth century the physical shape of the city of Turin was mainly transformed due to the industrialization process. Very fast and uncontrollable urbanization growth leads to residential neighborhoods sprawling around new, small and large industrial plants. As a consequence, the number of industrial areas within the city limits doubled over two decades following the adaptation of 1959 master plan.
"Taking Turin and the first-ring suburbs together, industrial areas occupied nearly a quarter of the total land area by 1980." [5]
The increasing industrialization of the inner-ring suburbs over the 1960s and 1970s and the abandonment of large-scale industrial factories and services located in Turin, at the beginning of late 1970s and through the 1980s were other two factors that had a direct impact on the physical transformation of the metropolitan area.
The industrialization of the inner-ring suburbs was as a consequence to the resettlement of mainly small to medium-sized industrial companies relocating from Turin to expand or improve production facilities. The move of industries away from Turin left notable voids in the city's physical fabric, yet the turning point for Turin was related to the closure and abandonment of the largest plants in the city.
"For the most part, these larger plants were not being relocated to the suburbs where they would have continued to provide local employment, but rather were closed as a result of shifting national and international manufacturing geographies." [6]

"By 1985, the closure of large-scale industrial plants and the abandonment of these areas were quickly becoming a dominant feature of the urban landscape. In 1982, production at FIAT's iconic Lingotto plant, perhaps the most recognizable symbol of Turin's industrial history was shut down." [7] "While attempts to quantify the scale of abandoned and disused lands vary significantly, by some estimates in 1989, 100 million square feet (10 million square meters) of abandoned industrial space scarred the urban landscape." [8]
A lot of dense residential areas rapidly grow around industrial sites with few public spaces and services. These districts were usually occupied by working-class families, and local services often reflected the production pattern of the industries themselves. They were often in need of more standard neighborhood centers and were perceived as unwelcoming and isolated, given their limited communication and integration with the historic city center.

Shutdowns, mass layoffs, and suburbanization left areas of social and economic blight across the city.The extent of social, economic and physical decline was such that even the historic center- the baroque jewel representing the artistic patrimony of the city--had fallen into disrepair.
"Once the symbol of Turin's regal past, the large public squares which characterized the historic city were overrun by cars and the streets were choked with congestion, street crime had become more common, and the ornate buildings were covered in soot and visibly deteriorating. The spatial dimensions of social inequity became increasingly discernible in the physical fabric of the city." [9]

[5] Dansero E., (1993), *Dentro ai vuoti. Dismissione industriale e trasformazioni urbane a Torino*, Libreria Cortina, Torino, p.64
[6] Dansero E., (1993), *Dentro ai vuoti. Dismissione industriale e trasformazioni urbane a Torino*, Libreria Cortina, Torino, p. 70-1
[7] Carter Donald K., (2016) *Remaking post-industrial cities : lessons from North America and Europe*, New York ; London, Routledge, p. 214-216
[8] Manzo E., (2012), *La Città che si Rinnova. Architettura e scienze umane tra storia attualità: prospettive di analisi a confronto*, Franco Angeli, Milano, p.144
[9] Carter Donald K., (2016) *Remaking post-industrial cities : lessons from North America and Europe*, New York ; London, Routledge, p. 214-216

3.2.2 City of Turin 1985-2015

Turin's transformation after rapid deindustrialization and social and economic crisis over three decades was mainly thanks to the citi's leadership.
"The transformation must be understood within the broader regional context of European integration and the national context of political reform in the wake of the 1991-1992 bribery scandals, which saw over half of Italy's parliamentarians indicted (Tangentopoli)." [10]
Legislation passed in 1993 allowing the direct election of mayors, giving mayors greater power over cabinet appointments. It complemented a 1990 law conferring to municipalities some limited discretion over local taxation and allowing the privatization of municipal services. These reforms increased transparency and local authority, ushering in a new era of accountability essential for facing Turin's enormous challenges.
"The period leading up to these reforms was a particularly tumultuous one for Turin's politics."[11] "Corruption scandals spelled the end of the Novelli administration in 1985 and plunged the city into political turmoil until finally the indebted city was placed in receivership by the central government in 1992." [12]
When Valentino Castellani, a professor of telecommunication engineering, was elected in 1993 for a mayor it was yet another turning point for Turin's politics. Turin was at the edge of population and economic collapse, the city needed the deep rethinking of the almost one hundred years old, Fordist model of economic development. The new leadership of the city and its elites started new, valiant strategies for Turin development.

3.2.3 The Piano Regolatore Generale di Torino (PRG) - 1995 City Master Plan

With adaptation of 1995 new masterplan, Turin began its physical transformation. The administration of mayor Castellani started its negotiations to create the public-private partnerships that could support the development and demolition of former industrial sites. The main goals of PGR master plan was to regenerate and rebuild the four areas of "Spina Centrale" (Spina 1,2,3,4).
"Partnerships included private owners of disused facilities, private property developers, the City of Turin, the Piedmont Region, the Italian National administration, the European Commission (URBAN program), Turin's largest private foundations (the Compagnia di San Paolo and the Fondazione CRT), and the State railroad company (Ferrovie dello Stato)." [13]
The undertaken actions to share the responsibility and resources between public and private investors was a key element in the development of Turin. Turin's industrial heritage that was dismissed and degraded was again in its spotlight, with new transformation projects for former brownfields,thanks to the new partnership approach.

While Turin was in the phase of redeveloping it's no longer in use industrial areas another problem raised that city leaders had to face. After the biggest automotive industries moved to other Italian and European cities, Turin was no longer the industrial pioneer, in fact Turin lost its main identification sign. And the main question is, what future Turin identity will be.
To answer this question Mayor Castellani initiated a strategic planning process in 1998 to create a vision for Turin's future, and the strategies and actions required to realize that vision.

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[10] Koff S.Z., Koff S.P., (2000), *Italy: From the First to the Second Republic*, Routledge, London, p. 2
[11] Carter Donald K. (2016) *Remaking post-industrial cities : lessons from North America and Europe*, New York ; London, Routledge, p. 214-216
[12] Winkler , *Torino City Report*, p.18
[13] Carter Donald K., (2016) *Remaking post-industrial cities : lessons from North America and Europe*, New York ; London, Routledge, p. 223

The process saw the engagement of a broad segment of civil society over the course of two years in a rich and complex dialogue that succeeded in building a new vision: a City of Action, a place with the ingenuity and capacity to imagine and realize, very concretely, its future. "The plan was in fact as much outward-looking as it was inward-looking, an attempt to convince itself and the outside world that Turin was a city with extraordinary potential, one capable of reinventing itself and building on skills and traditions developed over centuries to propel itself into a new future." [14]

Turin's development before was mainly focusing on design, engineering, and technology.
The new strategic planning brought into light and proposed the development of earlier dismissed sectors of the city such as culture, art and entertainment.
The city leaders decided to invest more into this sector hoping that it will be the future growth of the city 's economy. In fact Turins made huge progress in this sector by developing many museums and cultural events that were drawing visitors from across Italy, Europe and the world.
Thanks to the conscious re-branding of the city and the reconstruction of city identity and pride, Turin was becoming a dynamic, redefined and undiscovered corner of Italy and not any more degrading post-industrial city.

3.2.4 Winter Olympics and Turin's strategic plans

In 2006 Turin was chosen to host the Winter olympic, this event was a very important point in strategic planning for the city. Winter Olympics were the opportunity to transform Turin into a modern, innovative city and to leave behind the industrial past.
The Games also supported the idea that projects to physically heal the city and to improve the quality of its infrastructure, as well as the investments made in the development of cultural assets, could be focused. The 2006 Winter Games were the factor that promoted Turin at the international level, as Turin was benoming new innovative city.

The Second Strategic Plan

In 2004 new administration and mayor of Turin Mayor Sergio Chiamparino,wanted to continue and finish the economic rebuilding of the city started by the Castellani administration, and that led to the release of second strategic planning for the city of Turin.
The economic analysis undertaken showed that the great investment was laying in the culture and tourism sectors but also in technological innovation.
"The vision crystallized around the concept of a Knowledge City, one in which highly skilled workers add value at the highest rungs of the economic ladder in advanced manufacturing, specialized services, and the arts." [15]
The new strategic plan led to creation of many research and innovation centers. After the successful realization of the Winter olympics, Turin started to promote their big events, for example in 2011 Turin hosted the country's most important celebration of the 1.50th anniversary of the birth of the nation.
"Meanwhile, renewed emphasis was placed on creating metropolitan agencies in order to improve service integration and delivery throughout the metropolitan area: municipal waste disposal, transportation, water and sewage, and energy provision were each spun off into quasi-private authorities and "smart city" technologies began to be integrated into urban systems." [16]

[14] Carter Donald K., (2016) *Remaking post-industrial cities : lessons from North America and Europe*, New York ; London, Routledge, p. 223
[15,16] Carter Donald K., (2016) *Remaking post-industrial cities : lessons from North America and Europe*, New York ; London, Routledge, p. 223-224

3.2.5 The City in 2015

Major public sector intervention in the 1990s and 2000s concentrated on readaptation and redevelopment of industrial brownfields, renovation of the historic core of the city, upgrading of the transportation system, and regeneration of marginalized and peripheral neighborhoods.
The twentieth-century industrial identity of Turin and its herritage of physical decline were already rarely visible. The gray city with industries, residential districts and automobile identity was not present anymore.
The first changes began with a new city master plan in 1995 of Mayor Valentino Castellani and his administration, which focused on redefining land uses across the city, but particularly along the north-south rail corridor bisecting the city and the four major industrial areas along it.
“In conjunction with a major project by the national railroad authority to expand track capacity along the rail corridor, the master plan called for the tracks to be buried underground and the surface to become a six-lane artery into the heart of the city.” [17]
By changing the zoning of Spina Centrale’s four main areas for residential, commercial and open space, the plan settlement aimed to stimulate private-sector redevelopment and densification of the urban core through the development of a new neighborhood. The new development would be supported by the reorganization of the transport system.
“In the decade from 2000-2010, over 60 million square feet of abandoned industrial space were remediated, converted and repurposed, primarily along the “Central Spine”.” [18]
Examples of new, multi-functional transit-oriented areas are the new Intesa San Paolo headquarters designed by Renzo Piano at Porta Susa train station and the new Piedmont region skyscraper designed by Massimiliano Fuksas at Lingotto metro station. they are intended to serve as anchors for new development in the relevant areas.
Examples of remediation and conversion include the former steel foundries and tire production plants that are now occupied by a green business park and the new Dora Park neighborhood, as well as the Lingotto retail, conference and convention center.
The past transport networks that were built for industrial purposes have been re-invented to serve more integrated metropolitan areas. In the process of developing high-speed railways links to Milan and other cities, the historically small Porta Susa train station has been transformed into an ultra-modern international railway junction with the intention to connect Lyon and Paris with Milan, Venice and Budapest.
The barrier that was dividing the city from north to south for over a century was dismantled together with the railway tracks along the urban portion.
During the 2006 Winter Games the city’s first subway line was inaugurated and now connects the western part of the city with the city center and southern areas of the city.

3.2.6 The implementation of the Piano Regolatore Generale di Torino (PRG) and the new complex programs: Spina 1,2,3,4

The approval of the PRG in 1995 had a great impact in the phase of urban transformation and many interventions were started, especially the ones concerning the redevelopment of post-industrial sites and development of some large infrastructures for mobility. In the end of the 90’s some new transformations were added, designed as part of the Strategic

[17] Istituto di Ricerche Economico Sociali del Piemonte, (1988), Relazione sulla situazione economica, sociale e territoriale del Piemonte, Rosenberger & Sellier, Torino
[18] Carter Donald K., (2016) Remaking post-industrial cities : lessons from North America and Europe, New York ; London, Routledge, p. 218-219

Plan and for the purpose of the 2006 Olympic.

According to the rapport of Giorgio Rota committee the main the urban transformation processes were articulated along the following operational lines:
reorganization of the mobility system
urban transformation and regeneration on the axis of the Central Spine, Olympic works
environmental / socio-economic recovery and requalification of peripheral areas

“The approvement of urban redevelopment plans that were specified in PGR began in Turin in 1994, and the first program agreement (for the Superga PRIU, area between via Verolengo and Orvieto) was signed in July 1998, all the others followed within six months.”[19]
The programs for Spine 1, 3 and 4 involved large abandoned industrial areas, thus substantially implementing the indications of the PRG.
“In terms of total area, the PRUs have the greatest quantitative importance among the transformation tools (with 41.6 percent of the total surface), followed by the conventional transformations (12.4 per cent in ATS - Areas of transformation for services and 8.7 per cent in ZUT - Urban transformation zones). Most of the instruments mainly concern the residential sector, except in the case of detailed plans, which are mostly oriented to the production sector.” [19]

SPINA CENTRALE
The Spina centrale project makes it possible to recompose the fracture of the urban fabric caused by the centuries-old presence of railway tracks and, at the same time, to create a new strong axis of urban centrality: the program that was approved in December 1998, join commitment of public and private resources, especially on abandoned industrial areas near the railway, for about two million square meters where 53% is destined for new residences, 43%t for tertiary, advanced manufacturing, commercial and service activities and 4% for interventions of general interest.

SPINA 1
The southern area of the Spina projects is identified as Spina 1, located between Corso Lione, Mediterraneo, Rosselli and Tirreno, where once were the Officine Material Ferroviario - Materferro of Fiat, which is planned to be Zappata railway station. This is an area of 142,000 square meters, for a total investment (public and private) of over 80 million euros.
The transformation of this area, in which the new Sandretto Re Rebaudengo Foundation for contemporary art is established (former Fergat area), is articulated around a new pedestrian square. In October 2003, architect Massimiliano Fuksas was entrusted with the drafting of the preliminary and final projects, while the Municipality and the Region signed the memorandum of understanding that gives the green light to the entire operation.

SPINA 2
The area called Spina 2, on the other hand, is that of abandoned areas (already occupied by Officine Grandi Riparazioni, Nebiolo and Westinghouse), between Corso Castelfidardo, Ferrucci and via Boggio. This is an area of 340,000 sqm on which about 400 million euros are invested. It was planned to serve the Porta Susa station, an interchange between the passer-by and the underground.
The project of the new Porta Susa was characterized by its vocation to rethink all the surrounding space: the station is a long arcaded corridor, with an entrance from Corso Vittorio Emanuele and one from Corso San Martino, its urban surroundings was planned to consist

[19] Giorgio Rota Committee, (2004), Le radici del nuovo futuro - 2004 Quinto Rapporto Annuale Su Torino Digital: https://www.rapporto-rota.it/rapporti-su-torino/684-2004-le-radici-del-nuovo-futuro.html

of public spaces and new offices and hotels, located mostly towards Corso Vittorio, designed to be used at different times of the day and night, reducing the typical risks of degradation in the areas close to the stations. In this area, several other major interventions were also planned: the doubling of the Polytechnic, the new cultural center (with central civic library and theater hall), an exhibition center, the Urban Center of the City of Turin, one of the media villages for 2006 (with 1,400 places, that would become a university residence), also the area of the new prison was planned to be redeveloped to house judicial offices. Two twin skyscrapers were also planned , the one wanted by Banca San Paolo IMI and the Railways.

SPINA 3

Spina 3 is the area of greatest transformation of the PRG, amounting to over one million square meters, for a total investment of about 800 million euros. The area is divided into seven districts, based on as many disused industrial buildings: the three of the former CimiMontubi steel plants (Valdocco, Vitali, Valdellatorre), the former Michelin, Paracchi, Fiat Nole, Savigliano factories.

Many of the transformations in the Spina 3 area have already been carried out: first the Environment Park, one of the two Turin technology parks born from urban restyling operations, it stands on the former Teksid areas (about 25,000 square meters) and was built between 1997 and 2000 on a project by Emilio Ambasz, Benedetto Camerana and Giovanni Durbiano, with funding from the European Union. Opposite the Envipark, the Dora shopping center, with shopping center and parking has been active since 2003, built on the former Michelin area (about 100,000 square meters) between the via Livorno, via Treviso and Corso Umbria. The settlement, financed by the Sviluppo Dora-Novacoop company and a group of Milanese entrepreneurs, also includes new residences in Corso Umbria, for a total of 350 accommodations. In the former Vitali area the construction of the main media village for the Olympics was planned, and these spaces after 2006 were meant to be used for residential, tertiary, commercial and hotel sectors. In the former Savigliano workshops, an innovative and commercial tertiary pole of approximately 40,000 square meters was planned for IT companies, created by the newly formed company SNOS. The area between piazza Piero della Francesca, via Valdellatorre and via Nole was intended to house the new diocesan pastoral center, which would also include the new Church del Santo Volto.

Finally, the Spina 3 urban redevelopment program predicts a large park along the Dora river of 450,000 m2.

SPINA 4

The Spina 4 urban redevelopment program involved some abandoned industrial areas on the northern outskirts of the city. Commercial settlements were planned in Corso Vigevano area and residential settlements in the area between via Cigna and Docks Dora, integrated by commercial activities, this area of Spina 4 would also provide the new Rebaudengo railway station.

At the opposite end of the city were other areas of intervention as that of the Lingotto, the former historic Fiat factory transformed by Renzo Piano into a multifunctional center, which was a heart in the Lingotto Fiere and which over the years opened a congress center, auditorium, Le Méridien hotel, 8 Gallery, multiplex Pathé, supermarket and “Giovanni e Marella Agnelli” art Gallery.

3.2.7 Review of Piano Regolatore Generale di Torino (PRG) in 2019

Since the approval of PGR masterplan in 1995, in 25 years, the plan went through almost 300 smaller or bigger variations. “According to the rapport from 2019 made by Giorgio Rota committee there are six main reasons that led to those transformation of PGR:

1. strategic transformations, or variants made necessary to implement major interventions (examples are the transformations linked to the 2006 Olympic Games).
2. variants developed at the request of operators interested in investing in transformation areas, provided that the provisions of the PRG (for example by redefining the functional mix).
3. implementation of guidelines related to the redefinition of the guidelines of urban development by the administration, including, for example, the variants related to the redirection attempts of the Plan.
4. enhancement of public assets, as in the case of the variants linked to the securitization process of municipal properties.
5. regulatory compliance, related to the introduction of new laws and the consequent need to adapt the PRG.
6. corrections and adjustments, without substantially varying the indications of the PRG, but making slight operational changes or correcting any technical errors.” [20]

The 1995 PRG master plan was based on three main axes of urban development: Corso Marche, Spina Centrale and the axis of the Po river. These three main elements of the urban development master plan were managed differently over the time.

The axis of Corso Marchewhich in the comparison with other two was least implemented. The PGr previewed a strong integration between transport and urban development, along an axis on three superimposed levels. This would be associated with a profound urban transformation, largely developed on abandoned industrial areas, including the Fiat plants in Mirafiori acquired by TNE and the abandoned area of the Alenia Aeronautica plants.

Until 2019 many development projects were blocked due to many reasons such as technical, administrative and economic reasons.

Spina centrale was one of the developments that was the most implemented although it did not completely sign with the plans listed in 1995 PGR. The middle part of the Spina, called Spina 2, between piazza Statuto and corso Peschiera, had established a concentration of public and tertiary services, including the Porta Susa station, the Intesa Sanpaolo skyscraper, the offices of the metropolitan city, the court, the OGR, the Energy center and the Polytechnic Citadel. However, several voids that were planned to be transformed remain still undeveloped as the former Westinghouse area, second skyscraper the twin of the Intesa Sanpaolo one and part of the former new prison.

The transformations planned for Spina 1, from Largo Turati to Corso Peschiera and for Spina 3 from Piazza Statuto to Piazza Baldissera, also have been carried out. Furthermore, on Spina 3 there are still some gaps to be completed, as in the case of the former Vitali area, between via Orvieto, Verolengo, Borgaro and Corso Mortara, and on via Verolengo where there is part of the area of the former Superga factory.

In the case of Spina 4, between Piazza Baldissera and Corso Grosseto, along the axis of Corso Venezia, where the PRG planned the role of “gateway” to the city, with the construction of four mixed-use residential and tertiary towers the development went in different

[20] Giorgio Rota Committee, (2019), Futuro rinviato 2019 - Ventesimo Rapporto Giorgio Rota Su Torino Digital: https://www.rapporto-rota.it/rapporti-su-torino/2019-futuro-rinviato.html

ways.
The transformation prefigured by the PRG was far from being implemented. However an extensive regeneration intervention has affected the area between Corso Venezia, via Fossata, via Cigna and Corso Vigevano, with the construction of three building complexes (a fourth is currently under construction), commercial center and the Aurelio Peccei park.

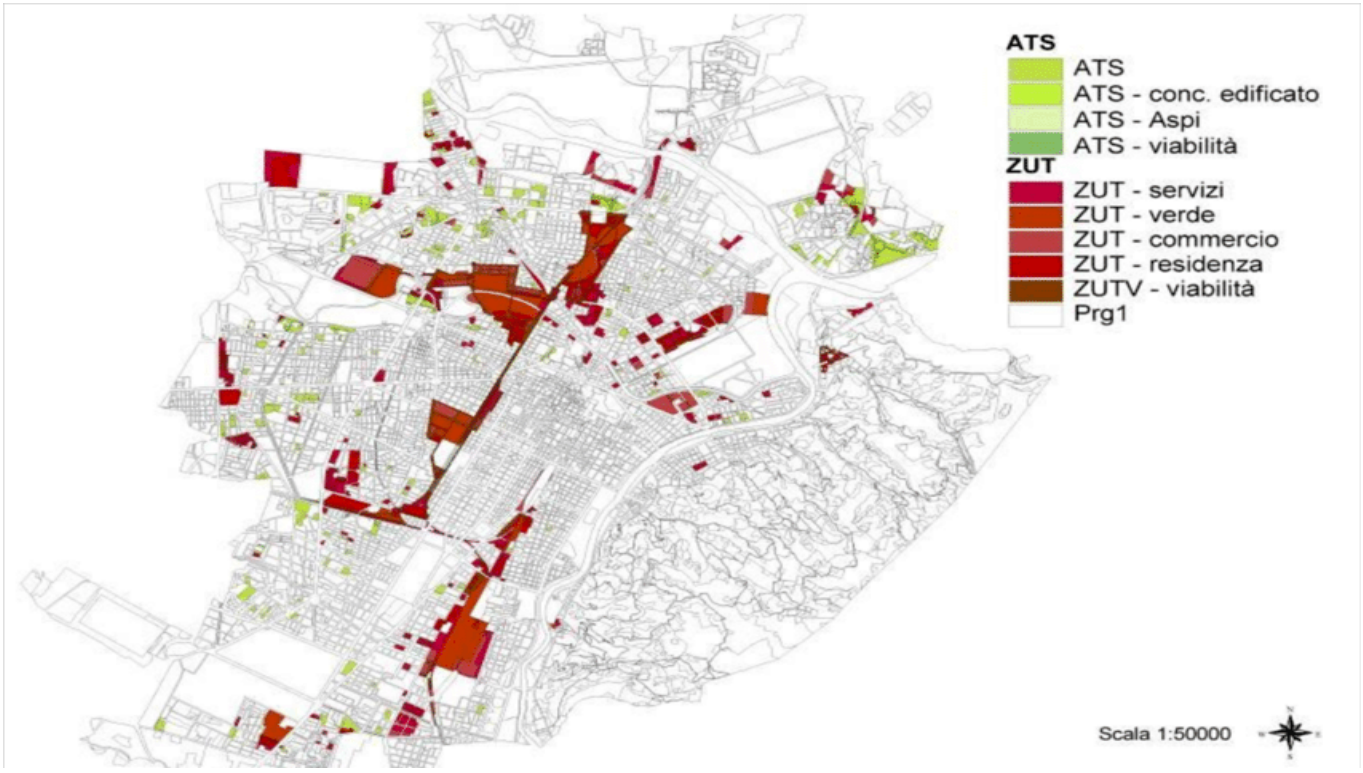


Fig.21 The regeneration of the city based on the abandoned industrial areas of which have become “Urban Transformation Zones (ZUT)” and “Areas for tertiary and services (ATS)”
Source: PRG Turin, 1995

Fig.22 Abandoned industrial areas (then transformed) in Turin in 80’s and 90’s
Source: Giorgio Rota Committee, (2016), Check-up 2016 - Diciassettesimo Rapporto Giorgio Rota Su Torino, p.30
Digital: https://www.rapporto-rota.it/rapporti-su-torino/2016-check-up.html

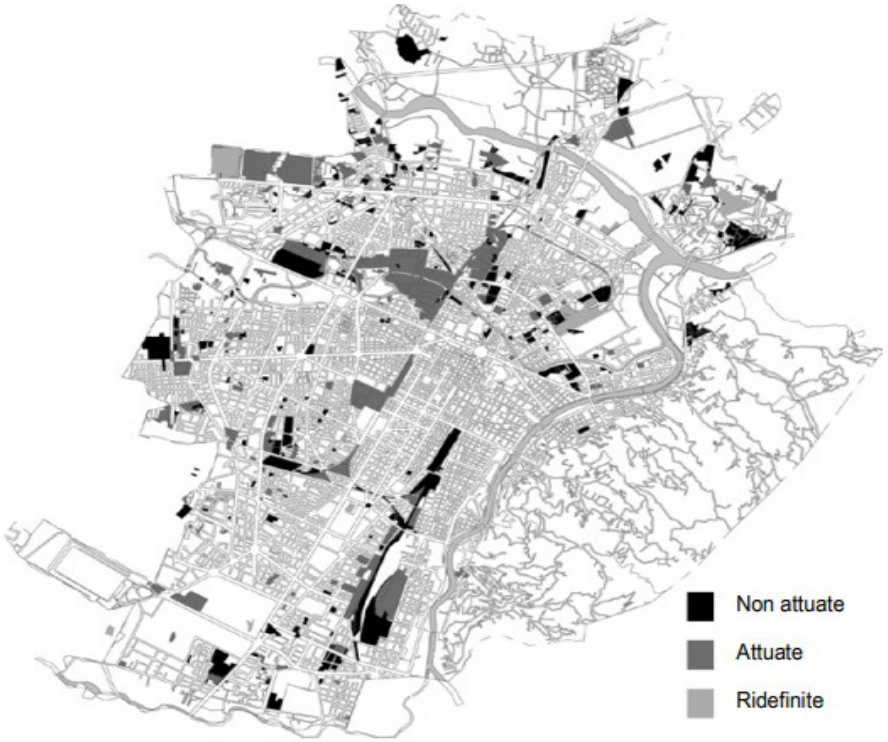


Fig.23 Implemented and not implemented areas of ZUT and ATS in Turin (Urban Transformation Zones (ZUT) and Areas for tertiary and services (ATS))
Source: Giorgio Rota Committee, (2016), Check-up 2016 - Diciassettesimo Rapporto Giorgio Rota Su Torino, p.31
Digital: https://www.rapporto-rota.it/rapporti-su-torino/2016-check-up.html

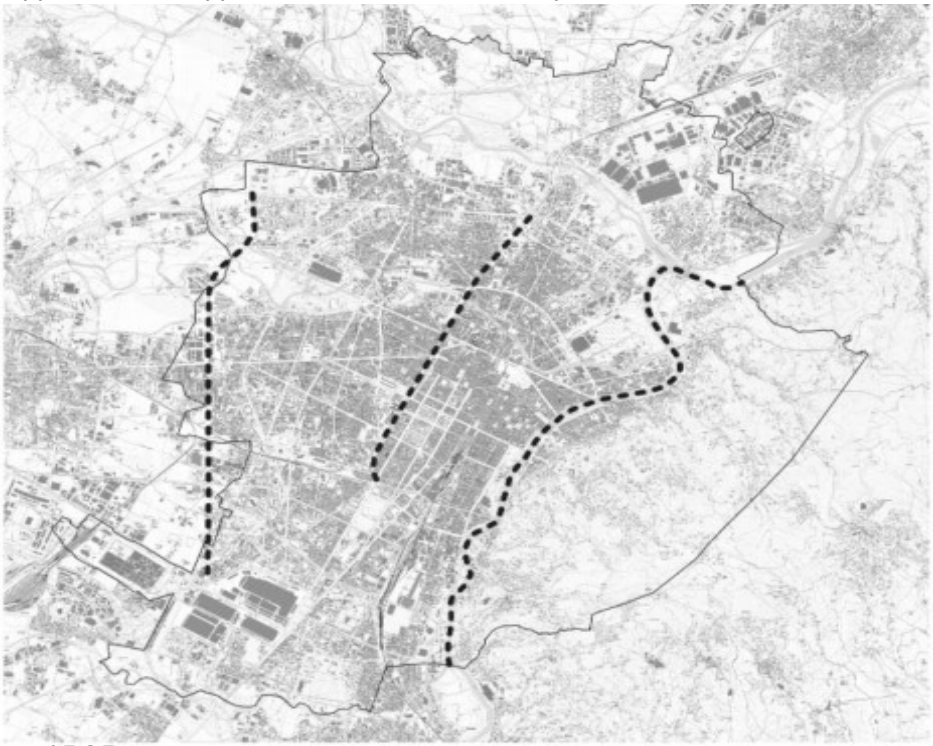


Fig.24 The three axes of PGR
Source: Giorgio Rota Committee, (2019), Futuro rinviato 2019 - Ventesimo Rapporto Giorgio Rota Su Torino, p.157
Digital: https://www.rapporto-rota.it/rapporti-su-torino/2019-futuro-rinviato.html

SUMMARY

After the great industrial era both cities of Łódź and Turin faced the crisis of rapid de-industrialization despite the different reasons that led to it.
At the turn of the 1980s and 1990s, the process of political and economic transformation in Poland took place. The transition from a centrally planned economy to a free market economy had far-reaching consequences for the Łódź textile monoculture. This change had a direct impact on the development of Łódź, factories were reformed or closed and their employees dismissed or included into new managerial relationships. As a result of the loss of the eastern market, the Łódź textile industry was rapidly subject to recession, until it finally collapsed in the 1990s. The former industrial facilities occupying a large part of the city center area in Łódź were abandoned and degraded.

In the case of Turin the shifting of the national and international manufacturing geographies caused the closure of large industrial plants. Initially the idea was to relocate mainly small to medium-sized industrial companies from Turin but the move of industries away from Turin left notable voids in the city's physical fabric, yet the turning point for Turin was related to the closure and abandonment of the largest plants in the city.
"By 1985, the closure of large-scale industrial plants and the abandonment of these areas were quickly becoming a dominant feature of the urban landscape. In 1982, production at FIAT's iconic Lingotto plant, perhaps the most recognizable symbol of Turin's industrial history was shut down." [21] While attempts to quantify the scale of abandoned and disused lands vary significantly, by some estimates in 1989, 100 million square feet (10 million square meters) of abandoned industrial space scarred the urban landscape." [22]

After many years of crisis, Łódź started the revitalization process of the city and redevelopment of brownfield sites.
Most of the sites were redeveloped and finished in 2014 some remained still used until today as the former factory of Zygmunt Jarociński, the buildings of the former "Warrant" warehouses, powerplant EC-2 , Grohman factories or WI-MA Widzew Cotton Industry Plants.

In case of Turin some interventions regarding redevelopment of brownfields that were mentioned in the PGR were carried out and some not as in example of one of the "Spina'' projects - Spina 1 where the railway was dug out and redeveloped.
On the issue of the point of reuse, the PGR 1995 identified areas called urban zones of transformation ZUT that regard brownfields. For each one of them the master plan has made a mini urban project, some have been implemented and are still in the phase of closing, others unfortunately not.

[21] Carter Donald K., (2016) *Remaking post-industrial cities : lessons from North America and Europe*, New York ; London, Routledge, p. 214-216
[22] Manzo E., (2012), *La Città che si Rinnova. Architettura e scienze umane tra storia attualità: prospettive di analisi a confronto*, Franco Angeli, Milano, p.144

4

BROWNFIELD AREAS TOWARDS THE CHALLENGES OF THE FUTURE, CLIMATE CHANGE AND COVID-19

4.1 Cities and their challenges

The challenges faced by Turin and Łódź do not differ from the challenges of other European cities and result from the transformations taking place and economic and technological conditions as well as striving to improve the living conditions of the inhabitants.

“A pandemic the effects we feel so painfully today, despite all of its drama, is just one of the many challenges that cities all over the world are facing today. To meet them, it is necessary to increase their resilience - the ability to adapt, survive and develop even in very difficult, unforeseen circumstances. It will also be crucial to ensure that they are smart, productive, green and fair.” [1]

Covid-19 pandemic was unpredicted and cities were not fully ready to overcome its challenges. The long lasting lockdown changed very rapidly the way of our life, work and use of services. After almost 3 years of restrictions cities are slowly coming back to normal but there is a rising question if this normal will be the same. We can not ignore the fact that the pandemic had quite a significant impact on how he perceived urban space, services and cities. The pandemic changed our daily priorities and routines.
During worldwide lockdown and isolation, cities unraveled the pressure to maintain high-quality public services, in particular tasks in the field of health, social care and education, has increased. Expenses for the implementation of these tasks are increased, with the simultaneous decrease in the incomes of cities, related to the economic slowdown.
We can assume that the effects of pandemic in terms of economic shutdown and income decline will apply to all cities, regardless of their size or functions. Nevertheless it is hard to assume the scale of the impact of the pandemic. Covid-19 raised many questions regarding the development of the cities and brought up many different concepts such as mixed use planning of neighborhoods or 15 minutes city concept. The pandemic contributed to an increase of the flexibility of cities in the approach to the provision of many services, shaping new forms of their implementation, including the dissemination of e-services addressed to an increasingly wider group of recipients.

Despite the struggle with Covid-19 pandemic cities are also facing much bigger challenges such as climate change. There is a high need for transformation towards cities that are fair, green and productive. These three dimensions are intended to contribute to the resilience and flexibility of cities, making them able to cope with the existing and upcoming social, economic and environmental challenges, while guaranteeing a high quality of life for their inhabitants.

Due to the importance attached to environmental challenges and nature, all cities should also take a very wide range activities aimed at: increasing the energy efficiency of buildings, reducing the emission of pollutants (heating, transport), improving the character of urban space by increasing the share of greenery, increasing the immunity cities to extreme weather phenomena and the effects of climate change.

There is a key document in the area of urban development that emphasizes the need to improve management and coordination of municipalities at all levels of management called New Leipzig Charter adopted by EU ministers for urban development (on 30 November 2020).

[1] Calak R., (2020), *W kierunku miast przyszłości in Miasta Wobec Wyzwań Przyszłości*, Wolność i Solidarność nr 87, p.21-29, Gdańsk

To implement the climate change challenges there is the European Green Deal plan, which the European Commission announced in December 2019 and which is a new growth strategy with the aim of transforming the EU into a modern society, resource-efficient and competitive economy that by 2050 will reach zero net greenhouse gas emissions (so-called climate neutrality).

CLIMATE CHANGE

4.2.1 Climate Change overview

"Climate change refers to long-term shifts in temperatures and weather patterns. These shifts may be natural, such as through variations in the solar cycle. But since the 1800s, human activities have been the main driver of climate change, primarily due to burning fossil fuels like coal, oil and gas." [2]
A wide range of other observations (such as reduced Arctic sea ice extent and increased ocean heat content) and indications from the natural world (such as poleward shifts of temperature-sensitive species of fish, mammals, insects, etc.) together provide incontrovertible evidence of planetary-scale warming.

"The world's population is quickly becoming urbanized. In 1950, less than 30% of the world's population lived in cities. This number grew to 47% in the year 2000 (2.8 billion people), and it is expected to grow to 60% by the year 2025. The world's urban population is expected to increase to 84 % by 2050, i.e. from 3.4 billion in 2009 to 6.3 billion in 2050. All this means more and more people will be living in urban areas, as more and more people migrate to cities. There are many challenges and opportunities for sustainable development in cities that need to be addressed." [3]
The average temperatures of Earth have relatively risen over the decades. The changes in earth's temperatures is strongly correlated with carbon dioxide concentrations in the atmosphere, the higher concentration the higher the temperature rise is.
The level of CO^2 for August of year 2022 is 417.19 ppm (https://www.co2.earth/ accessed 14th of September) while in August 2021 the level of CO2 was 414.47 ppm which can only indicate that levels are constantly rising. In addition the global average surface temperature in July 2022 was 1.15°C above the average for the comparison period of 1880-1920. Earth since 1850 almost every decade has been getting warmer.
"Since preindustrial times, the atmospheric concentration of CO^2 has increased by over 40%, methane has increased by more than 150%, and nitrous oxide has increased by roughly 20%. More than half of the increase in CO^2 has occurred since 1970. Increases in all three gasses contribute to warming of Earth, with the increase in CO^2 playing the largest role." [4]
"A wide range of other observations (such as reduced Arctic sea ice extent and increased ocean heat content) and indications from the natural world (such as poleward shifts of temperature-sensitive species of fish, mammals, insects, etc.) together provide incontrovertible evidence of planetary-scale warming." [4]

All major climate changes, including natural ones, are disruptive. Past climate changes led to extinction of many species, population migrations, and pronounced changes in the land surface and ocean circulation. The speed of the current climate change is faster than most of the past events, making it more difficult for human societies and the natural world to adapt.

THE EARTH IS WARMING AND THE CLIMATE IS CHANGING

[2] https://www.un.org/en/climatechange/what-is-climate-change
[3] Chan N. W. and Professor Chan, (2017), *URBANIZATION, CLIMATE CHANGE AND CITIES: CHALLENGES AND OPPORTUNITIES FOR SUSTAINABLE DEVELOPMENT*
[4] The Royal Society, (2020), *Climate Change Evidence & Causes, An overview from the Royal Society and the US National Academy of Sciences,* National Academy of Sciences

Today above 60% of the world population lives in cities and the numbers are still rising. Cities are responsible for over 70% of global greenhouse gasses emission and use 3/4 of global energy. They say that by 2050 almost 85% of the European population is going to live in the cities. That said cities play a major role in mitigation of climate change and their adaptation to climate change can significantly reduce its impacts and meet the needs of future generations without compromising the present ones.

Emission of GHG and energy consumption are the leading contributors to global warming and climate change especially in cities. The main GHG released in cities comes from transportation but also housing.

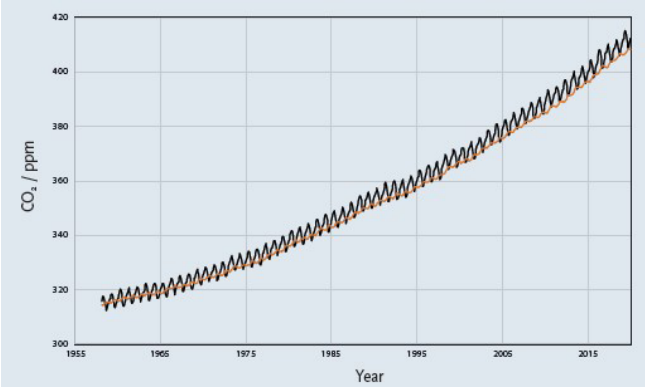


Fig. 25 Measurements of atmospheric CO2 since 1958 from the Mauna Loa Observatory in Hawaii (black) and from the South Pole (red) show a steady annual increase in atmospheric CO2 concentration. The measurements are made at remote places like these because they are not greatly influenced by local processes, so therefore they are representative of the background atmosphere. The small up-and-down saw-tooth pattern reflects seasonal changes in the release and uptake of CO2 by plants.Source: Scripps CO2 Program.

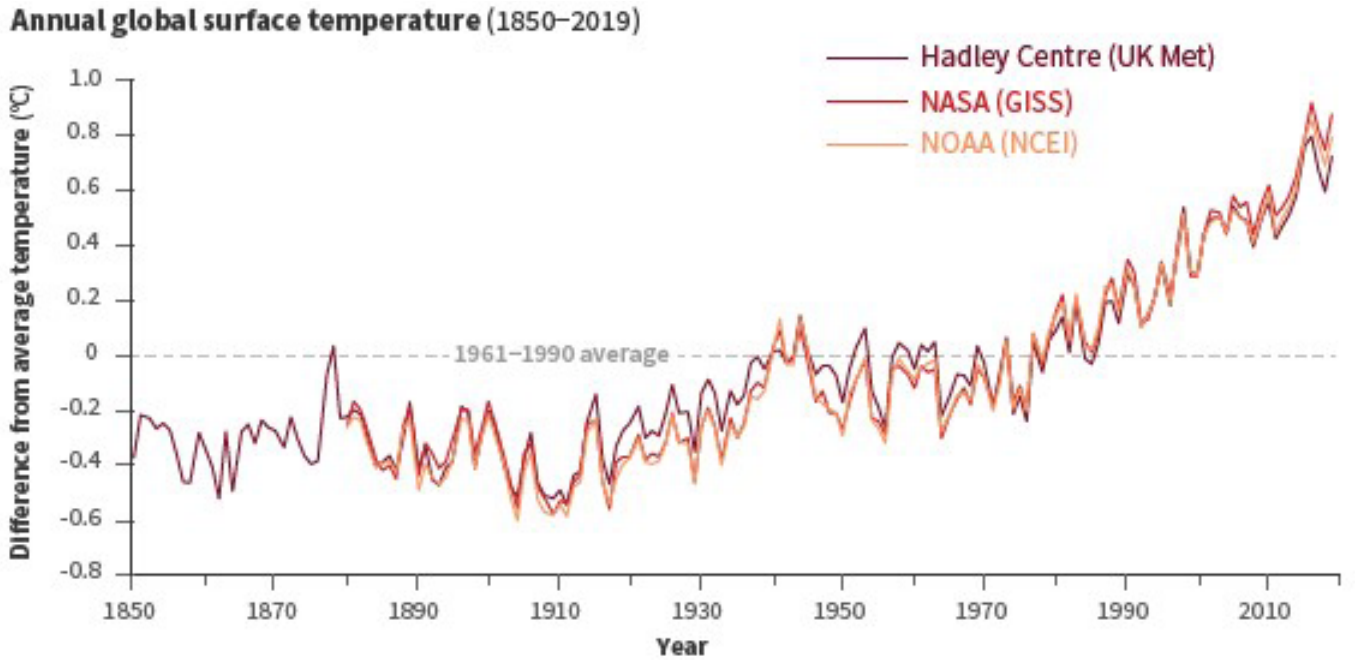


Fig. 26 Earth's global average surface temperature has risen as shown in this plot of combined land and ocean measurements from 1850 to 2019, derived from three independent analyses of the available data sets. The temperature changes are relative to the global average surface temperature of 1961–1990.
Source: NOAA Climate.
gov; data from UK Met Office Hadley Centre (maroon), US National Aeronautics and Space Administration Goddard Institute for Space Studies (red), and US National Oceanic and Atmospheric Administration National Centers for Environmental Information (orange).

4.2.2 Population density and climate change

Newman and Kenworthy in 1989 provided the study that determined the relationship between population density and transport energy consumption for 32 primary global cities. After conducting research they prepared the policy recommendations for realizing fuel saving potentials and reducing transport GHG emissions by changing urban form parameters (e.g., increasing population density).

"These recommendations have been broadly considered in international policy-making (Wegener 1996) and have been widely promoted for advantageous urban planning (Barrett 1996; Black 1996; Breheny 1995; Cervero 1988; Creutzig et al. 2012a; Mindali et al. 2004)." [5]

There is also another research by Newman and Kenworthy that studies the influence of population density on the housing sector that shows that the denser the housing the less energy is used for heating.

In the study of Baur A.H., Thess M., Birgit Kleinschmit B., and Creutzig F. from 2005 they tried to test the assumptions of Newman and Kenworthy by conducting their own study on 134 European urban areas.

The studies of Newman and Kenworthy were first published in 1989 for 32 global cities (Newman and Kenworthy 1989) and again in 1996 for 88 global cities and they both showed the transport GHG emissions (in the form of passenger car usage) and population density are mutually related.

Fig.27 represents the data from Kenworthy and Laube study from 1996 and the data is showing how population density is affecting gasoline consumption for various cities on a continental level. It is noted by Baur A.H., Thess M., Birgit Kleinschmit B., and Creutzig F. that "within all continents the correlation found between population density and transport GHG emissions is generally weaker than for the global scale. Population density seems to be less influential on the amount of passenger car usage on the continental level than on the global scale for NK's 88 cities." [5]

In Fig.28 we can see the data of studies that were conducted by Baur A.H., Thess M., Birgit Kleinschmit B., and Creutzig F. on transport CO2 emission data for 134 European urban areas. The study approach was to reconstruct the analysis of Newman and Kenworthy. As mentioned in research it was not possible to reconstruct Newman and Kenworthy's research on European cities since the data was containing only continental data. The same analysis was prepared for national level study where we can see on Fig. 29 and 30 the results for Spain and France. Although the deep study was made by Baur A.H., Thess M., Birgit Kleinschmit B., and Creutzig F., the result was that "population density cannot be identified as a dominant driver for urban GHG emissions for European cities (neither for transportation GHG emissions, nor for total urban GHG emissions). However, respective correlations were stronger on the national level." [5]

"Reinvestigating the observations of NK and KEN for European cities, it is found that the geographical scope of analysis crucially influences the correlation of population density with GHG emissions." [5]

[5] Baur A.H., Thess M., Birgit Kleinschmit B., and Creutzig F., (2013), "Urban Climate Change Mitigation in Europe -Looking At and Beyond the Role of Population Density" in *Journal of Urban Planning and Development*, 140, 10.1061/(ASCE)UP,1943-5444.0000165

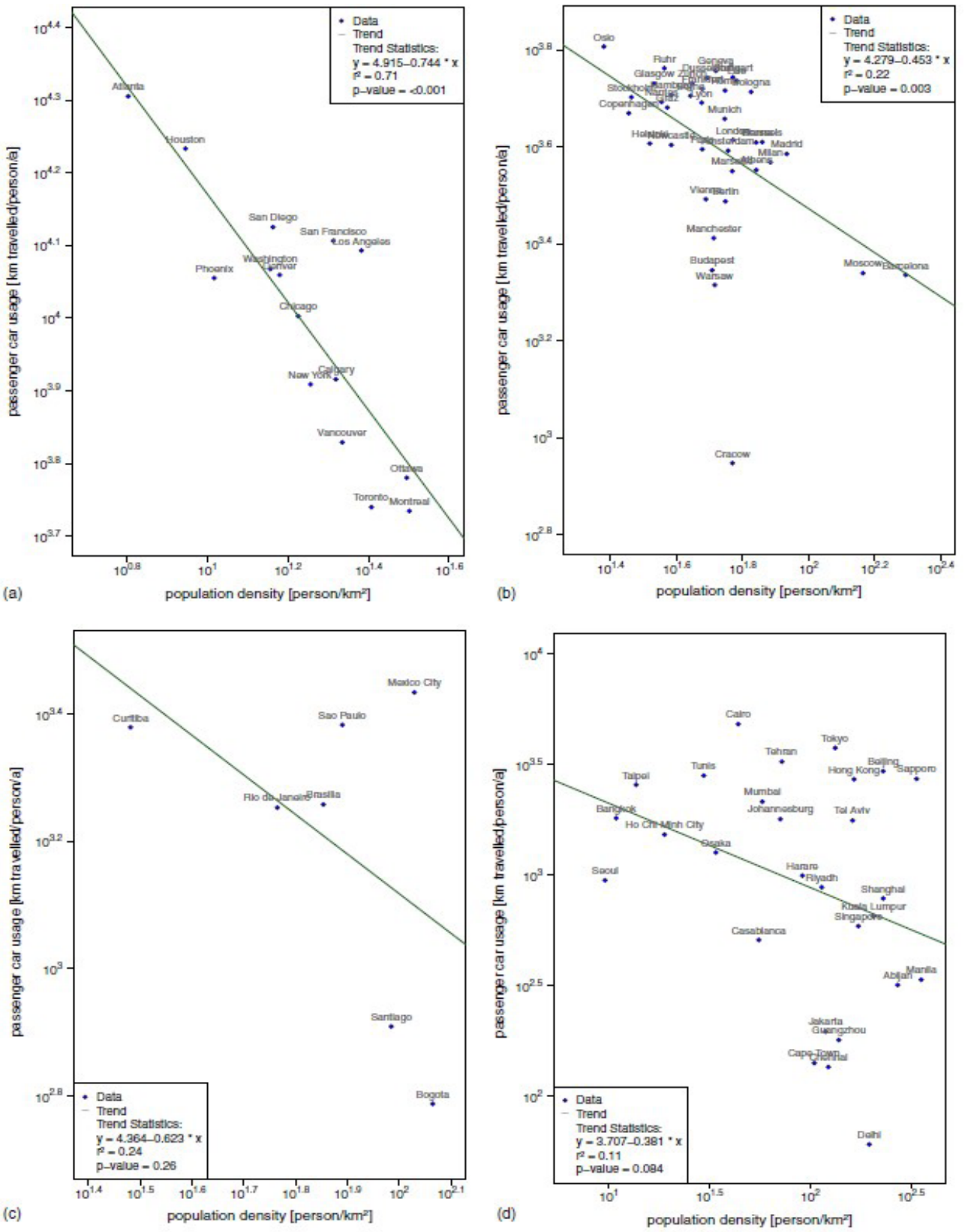


Fig. 27 Population density affecting gasoline consumption for various cities, shown as linear correlations in plots with logarithmic axes: (a) 15 North American cities; (b) 38 European cities; (c) seven South American cities; (d) 28 Asian cities [created from data from Kenworthy and Laube (1996)]

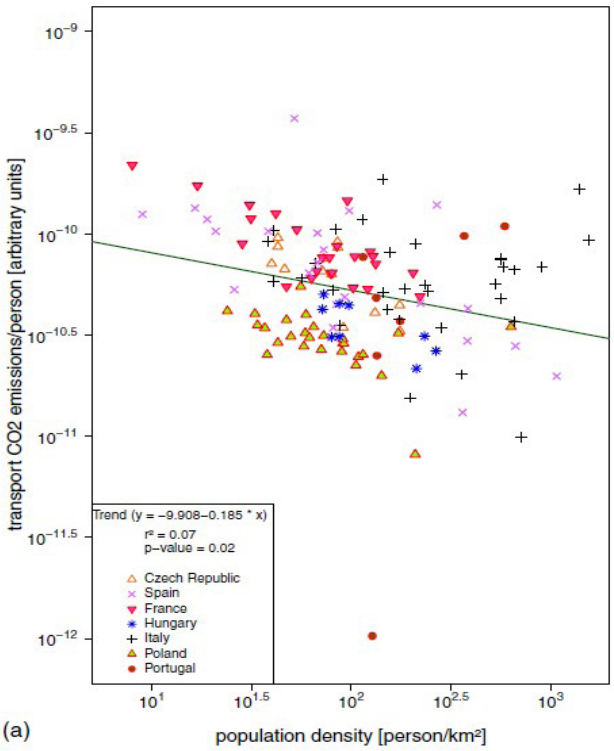
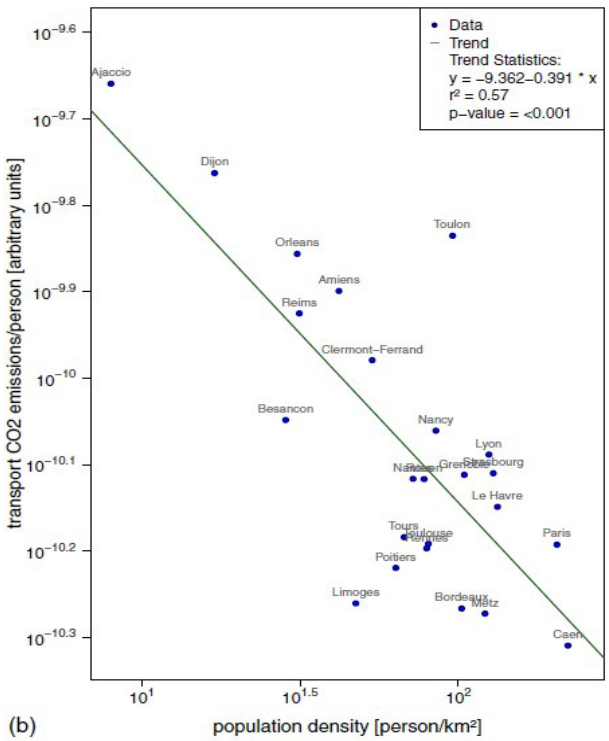


Fig.28 Population density affecting CO2 emissions from ground transportation for various cities; median data shown as linear correlations in plots with logarithmic axes - 134 European cities



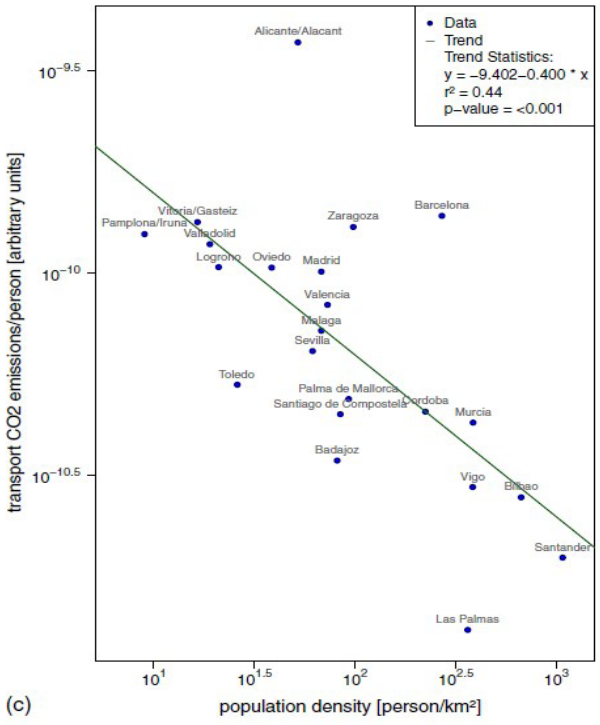


Fig.29 and 30 Population density affecting CO2 emissions from ground transportation for various cities; median data shown as linear correlations in plots with logarithmic axes: (a) 134 European cities; (b) 24 French cities; (c) 22 Spanish cities [created from data from Balk et al. (2005)9. European Commission, Joint Research Centre (JRC)/ Netherlands Environmental Assessment Agency (PBL) 2009]

4.2.3 Climate change policies

Climate change is probably the biggest challenge of the time and it is rather a local issue. Cities can play a key role in developing and implementing climate change programs because they are located at the interface of local action and national and international level climate change adaptation and mitigation commitments.
We have many programs and politics on climate change implementation, from global to local level. For instance, " The Intergovernmental Panel on Climate Change (IPCC) is the international body for assessing the science related to climate change. The IPCC was set up in 1988 by the World Meteorological Organization (WMO) and United Nations Environment Programme (UNEP) to provide policymakers with regular assessments of the scientific basis of climate change, its impacts and future risks, and options for adaptation and mitigation. IPCC assessments provide a scientific basis for governments at all levels to develop climate related policies, and they underlie negotiations at the UN Climate Conference – the United Nations Framework Convention on Climate Change (UNFCCC). " [6]

As one of the most known actions on climate change we can mention the Paris Agreement or European Green Deal. The Paris Agreement is a legally binding international treaty on climate change. It was adopted by 196 Parties at COP 21 in Paris, on 12 December 2015 and entered into force on 4 November 2016. It aims to limit global mean temperature rise this century to well below 2 C above pre-industrial levels. The central aim of the Paris Agreement is to keep global temperature rise this century well below 2 C above pre-industrial levels, and to pursue efforts to limit the temperature increase even further, to 1.5 C. Furthermore, the agreement aims to strengthen the ability of countries to deal with the impacts of climate change. This target has wide-ranging implications for Europe and its cities, which are the source of substantial greenhouse gas emissions, where approximately 74% of the population lives in urban areas.

On a local level cities design and implement local climate plans (LCPs). European LCPs have been associated with the size of a city, gross domestic product (GDP) per capita and with adaptive capacity.

"Climate change planning in European cities is therefore often determined by local institutional capacity rather than by a proactive response to anticipated future needs. European national and local government climate change policies have prioritized mitigation over adaptation. This preference might be motivated by other benefits of mitigation, such as economic savings and improved energy security, in addition to reduced emissions. Similarly, adaptation in cities is seldom carried out systematically with measures across several sectors. Adaptation implementation often depends on alignment with other programmes (e.g. health) that are designed to address non-climate related problems as well.

The LCPs of European cities are drafted and published in a variety of forms, and vary in terms of detail, structure and scope. Some of the plans are comprehensive stand-alone documents, such as comprehensive adaptation or mitigation plans. Other LCPs are integrated into another document such as a sustainability plan, resilience plan, or Local Agenda 21, and these sometimes integrate adaptation and mitigation." [7]

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[6] https://www.ipcc.ch/about/

[7] Reckien D. , Salvia M. , Heidrich O. , Church Jon M., Pietrapertosa F., De Gregorio-Hurtado S., D'alonzo V., Foley A., Simoes S.G., Krkoška Lorencová E., Orru H., Orru K.,Wejs A., Flacke J., Olazabal Marta., Geneletti D., Feliu E., Vasilie S., Nador C., Krook-Riekkola A., Matosović, Marko Fokaides Paris A., Ioannou B. I., Flamos A., Spyridaki Niki-Artemis., Balzan M. V., Fülöp O., Paspaldzhiev I., Grafakos S., Dawson R., (2018) *How are cities planning to respond to climate change? Assessment of local climate plans from 885 cities in the EU-28*, Journal of cleaner production, Vol.191, p. 207-219
Digital: https://www-sciencedirect-com.ezproxy.biblio.polito.it/science/article/pii/S0959652618308977

4.2.4 European Green Deal

Climate change and environmental degradation are serious challenges and threats to the world and Europe. To overcome these challenges The European Commission proposed the European Green Deal, which is European Climate law that sets a new net greenhouse gas emissions reduction target of at least -55% by 2030, compared to 1990 levels. The main aim of the European Green Deal is to make Europe climate neutral by 2050.

"The European Green Deal also helps out in the COVID-19 pandemic emergency where one third of the 1.8 trillion euro investments from the Next Generation EU Recovery Plan, and the EU's seven-year budget will finance the European Green Deal." [8]

"It is a new growth strategy that aims to transform the EU into a fair and prosperous society, with a modern, resource-efficient and competitive economy where there are no net emissions of greenhouse gasses in 2050 and where economic growth is decoupled from resource use. It also aims to protect, conserve and enhance the EU's natural capital, and protect the health and well-being of citizens from environment-related risks and impacts. At the same time, this transition must be just and inclusive." [9]

Eight elements of the European Green Deal:
"- a zero pollution ambition for a toxic-free environment
- preserving and restoring ecosystems and biodiversity
- from 'Farm to Fork': a fair, healthy and environmentally friendly food system
- accelerating the shift to sustainable and smart mobility
- building and renovating in an energy and resource efficient way
- mobilizing industry for a clean and circular economy
- supplying clean, affordable and secure energy
- increasing the EU's Climate ambition for 2030 and 2050" [10]

It is interesting to note the point of building and renovating in an energy and resource efficient way, which puts into attention that the building sector, construction as well as renovation of buildings use a significant amount of energy and natural mineral resources.
"Buildings also account for 40% of energy consumed. Today the annual renovation rate of the building stock varies from 0.4 to 1.2% in the Member States. This rate will need at least to double to reach the EU's energy efficiency and climate objectives." [11]

That is why the renovation of already existing buildings is crucial in order to reach Europe climate-neutrality (net zero emissions) by 2050. Renovating public and private buildings is essential to reach the objectives of the European Green Deal. The still existing brownfield areas in Turin and Lodz could be great opportunities for renovation of sites and buildings for increasing energy efficiency and mitigation of climate change.
That is why the EU and the Member States should encourage a 'renovation wave' of public and private buildings to overcome the challenge of energy efficiency and economic cost. Renovation waves can lower energy bills and reduce energy poverty, it can also boost the construction sector and is an opportunity to support small and medium-sized enterprises and local jobs. Moreover, each European country and city should create a long-term renovation strategy to mitigate climate change.

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[8] https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en
[9] The European Commission (2019, December 18), The European Green Deal, Brussels, COM (2019) 640 final, p.2 from: https://www.epeaswitzerland.com/2019/12/a-european-green-deal/
[10] The European Commission (2019, December 18), The European Green Deal, Brussels, COM (2019) 640 final, p.3 from: https://www.epeaswitzerland.com/2019/12/a-european-green-deal/
[11] The European Commission (2019, December 18), The European Green Deal, Brussels, COM (2019) 640 final, p.9 from: https://www.epeaswitzerland.com/2019/12/a-european-green-deal/

4.2.5 Reuse and redevelopment of brownfield areas to mitigate climate change

Climate change is happening and according to many studies there are two main solutions that can mitigate climate change, the reduction of greenhouse gas emissions and address the adaptation measures.
The main source of 4/5 of the total gas emissions in the EU is due to energy consumption. According to Jasna Cizler research on "Brownfield redevelopment as a measure for climate changes mitigation", "the energy savings are the fastest, most efficient and most economical way to reduce greenhouse gas emissions and improve air quality, especially in densely populated areas. Increasing the resilience to the effects of climate changes is an opportunity for investment in a low-carbon economy through the promotion of energy efficient concepts and the acceptance of ecological solutions." [12]

Urban development is a very important factor that can play a big role in climate change mitigation. As mentioned before, almost 60% of the world population lives in cities and about 70% in Europe where over 80% of the CO2 is produced in the million cities. That said, the adaptation of mitigation policies to prevent climate change in urban planning in the cities can be one of the key solutions to the future challenges.
The construction sector is a great opportunity to impact the production of greenhouse gasses and the reduction of energy consumption through the amount of energy that will later be spent and the choice of materials for construction. Moreover there are almost 2,000 km² of abandoned industrial sites that show the great potential for the construction and redevelopment and could work as a part of adaptation measures to mitigate the climate change in cities planning.

Sustainable urban development requires the development of dense forms of housing and preservation of the natural landscape. The biggest threat in future development in cities is rapid urbanization and urban sprawl. The cities expand their urban areas in a very fast way beyond their city barriers, reducing at the same time the agricultural land, green areas, forests in order to build new construction lands and roads. Rapid urban sprawl also leaves behind a lot of urban voids of unused and abandoned areas inside the cities at the expense of reduction in natural land. Redevelopment of brownfields areas can limit the urban sprawl and refine the environmental quality of the cities and have at the same time economic and ecological benefits.
The redevelopment of former industrial sites reduces the need for development on undeveloped, greenfield sites.

"Brownfields are usually former industrial and military complexes. In situations when cities are constantly spreading at the expense of green areas, and former industrial locations in cities are unused, sustainable land use involves concepts such as land recycling and activation of unused buildings for new uses."[12]

Recycling of brownfields areas is a great opportunity for the development of the cities but it requires the reintegration of brownfield land into economic and natural Cycles. Brownfield regeneration can also reduce urban sprawl, which is associated with energy savings and reduction of gas emissions that derive from reduced commuting distances and car use.
Brownfield areas usually have already existing infrastructure and reuse and renovation

[12] Cizler J., (2013), "Brownfield redevelopment as a measure for climate changes mitigation" in *Journal of the Geographical Institute Jovan Cvijic*, SASA, 63, p. 57-73, 10.2298/IJGI1304057C

can limit the use of materials on site and limit the costs of whole development. The brownfields area preservation, adaptation and reuse can reinforce the saving of time, energy and resources. Because they are already located within city barriers they can also support the high density neighborhoods since the high density developments contribute to energy efficiency. The high density constructions limit exposed surfaces where multi dwelling housing saves 20-50% of energy compared to single - family buildings.

4.2.6 Sustainable Brownfields Redevelopment policies in Europe

"Brownfields rehabilitation in Europe presents valuable opportunities for private investments and for limiting the practices of land taking and urban sprawl, making cities safer, healthier, and more attractive economically." [13]
"European urban development is part of the sustainable development mechanism and can improve the environment through brownfields reuse and reduction of air, water, and soil pollution." [14]
In recent decades, many EU cities successfully reused abandoned sites; for example, the regeneration of industrial and military brownfields occurred through support from the European Regional Development Fund/ Cohesion Fund." [15] Concurrently, investments in green spaces fields (i.eGreenfields, which are undeveloped lands that are left "natural" in the urban landscape) and brownfields rehabilitation are seen as new development opportunities." [16]

Brownfield areas are usually dilapidated and abandoned areas where many of them can have real or discern contamination problems. They require the intervention and special attention to be brought back to beneficial use and brought back to the economy since they have unfavorable effects on the quality of urban life. The redevelopment of brownfield areas is usually more complex that development of common greenfields, the special care and guidelines.
The attention must be brought to the fact that potentially contaminated sites are usually located close to city centers. They can offer a variety of opportunities for the city and investors which brings us to another problem concerning the redevelopment of brownfields. Brownfield areas usually have the different interests of a variety of stakeholders, including regulators, investors, land owners, developers, consultants, academics, community groups, technology providers and the financial sector which means the variety of projects and guidelines.

Unfortunately there is no one common, specific rule for dealing with brownfields areas in Europe.
"There are no EU standards to define contaminated sites and associated environmental health risks. This lack of standards is further complicated in that no single methodology defines site-specific remediation standards." [17]
Brownfields remediation, however, is a 2014–2020 EU priority that is incorporated in several policies, such as the 2030 Sustainable Development Goals and Agenda." [18]

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[13] European Commission, (2012), Commission Staff Working Document, Guidelines on best practice to limit, mitigate or compensate soil sealing (SWD[2012]101Final). https://ec.europa.eu/transparency/regdoc/rep/10102/2012/EN/SWD-2012-101-F1-EN-MAIN-PART-1.PDF
[14] European Commission, (2016a, November 22), Sustainable development: EU sets out its priorities [Press release] https://ec.europa.eu/commission/presscorner/detail/en/IP_16_3883
[15] European Court of Auditors. (2012). Have EU structural measures successfully supported the regeneration of industrial and military brownfield sites? https://www.eca.europa.eu/Lists/ECADocuments/SR12_23/SR12_23_EN.PDF
[16] European Commission. (2016b). Greenfield foreign direct investment and structural reforms in Europe: What factors determine investments? https://ec.europa.eu/info/sites/info/files/dp033_en.pdf
[17] European Environment Agency, (2017), Progress in management of contaminated sites https://www.eea.europa.eu/data-and-maps/indicators/progress-in-management-of-contaminated-sites-3/assessment
[18] European Commission, (2016a, November 22), Sustainable development: EU sets out its priorities [Press release] https:/ ec.europa.eu/commission/presscorner/detail/en/IP_16_3883

"EU policies take into account the direct and indirect impact of land use, including the use of undeveloped land and natural areas through urban sprawl and energy production." [19]

In the research paper made by Morar C., Berman L., Unkart S., Erdal S. - Sustainable Brownfields Redevelopment in the European Union: An Overview of Policy and Funding Frameworks from 2021, the authors tried to identify the main European Union policy frameworks related to the brownfields that mention the necessity and importance of sustainable redevelopment of brownfield areas. The European Union policy frameworks related to the brownfields are mentioned below.

"The European Union Policy Framework Related to Brownfields:" [19]

European Union 2030 Agenda for Sustainable Development and Sustainable Development Goals
"Includes sustainable development goals in the European policy framework and current European Commission priorities based on the three pillars of sustainable development: society, environment, and the economy." [20]
The 2030 Agenda a) calls for reducing negative impacts of urban activities and chemicals that are hazardous to human health and the environment and b) includes environmentally sound chemical management plans, reduction and recycling of waste, and more efficient use of water and energy.
Brownfield development can be supported by the directive that cities and inhabitants' environments should be resilient, safe and sustainable that restore, protect and encourage the sustainable use of terrestrial ecosystems and cease the land degradation.

7th Environment Action Programme

The 7th EAP's focus on sustainable cities can promote brownfields redevelopments as opportunities for sustainable redevelopment.

European Environmental Directives: Waste, Water, and Air Quality Legislation

The European Waste Framework Directive states that soil contaminated by fuels leaking from underground tanks should be regarded as waste (European Commission, 2018a)." [21]
This directive addresses water pollution and promotes discovery and monitoring of environmental contamination. Similarly, the European Air Quality Directive (European Commission, n.d.-a) focuses on air quality impacts of specific contaminants from both natural and industrial sources in ambient air via the 2008 Air Quality Directive and the Fourth Daughter Air Quality Directive.
These regulations could be the drivers that promote the cleanup and redevelopment of brownfields.

Urban Agenda for the European Union

It supports cooperation among EU member states, cities, the European Commission and other stakeholders; it aims to stimulate growth, liveability, and innovation in EU cities and to identify and successfully tackle social challenges.
The Urban Agenda for the EU promotes urban regeneration that includes social, economic, environmental, spatial, and cultural aspects, the sustainable use of land, limiting the greenfield consumption and tactical urban planning. These directives could be the main principles to brownfield redevelopment.

[19] Morar C., Berman L., Unkart S., Erdal S.,(2021), *Sustainable Brownfields Redevelopment in the European Union: An Overview of Policy and Funding Frameworks*, J Environ Health, 2021 Nov, 84(4): 24-31, PMID: 35350129; PMCID: PMC8959022
[20] European Commission, (2016a, November 22), *Sustainable development: EU sets out its priorities* [Press release] https://ec.europa.eu/commission/presscorner/detail/en/IP_16_3883
[21] European Commission. (2018a). Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives. https://eur-lex.europa.eu/eli/dir/2008/98/2018-07-05

Soil Thematic Strategy

It was adopted in 2006 and proposed protection of soils in the EU.
The strategy promotes minimizing additional land acquisition and limiting, mitigating, or compensating soil sealing, calling for efficient use and restoration of previously acquired land." [22] These regulations can support the reuse of abandoned areas with already existing infrastructures and prevent development of greenfields.

European Union Biodiversity Strategy for 2030

It represents a long-term plan for protecting nature and reversing degradation of ecosystems.
"The EU Biodiversity Strategy for 2030 advances the European Green Deal to make Europe climate neutral by 2050 by supporting green technology, sustainable industry and transport, and pollution reduction." [23]
The reuse and development of brownfields can reinforce the strategy for healthy and sustainable communities by turning blighted and abandoned spaces into community assets, creating green space, restoring watersheds, reducing the urban heat island effect and protecting the night sky and wildlife.

Green Infrastructure Strategy

It supports cost-effective alternatives to traditional "grey" infrastructure (the built environment) and offers many other benefits to EU residents and to biodiversity.
"Grey" infrastructure such as brownfields can be reused into a more sustainable environment by incorporating into redevolped sites green spaces.

"The "polluter pays principle," which expects polluters to bear the costs of remediation or cleanup, applies to all EU funding and overall redevelopment mechanisms." [24]
Unfortunately in Europe these rules are often not applied in terms of redeveloping brownfields areas. Brownfield redevelopment usually is left to lack of funds for its renewal and the provided funds do not cover the cleanup of sites. The redevelopment of brownfields is usually founded by local sources or private investment

"The EU also has a complex framework of funding to support regional, cross-border, and multi city (or member state) redevelopment projects." [25]

There are many founding organizations in Europe that support the development of brownfield areas where two main ones are the Cohesion Fund and the European Regional Development Fund (ERDF) with other complementary founding such as Urban Innovative Actions, URBACT III 2014–2020, LIFE Programme, European Investment Bank, URBIS and Horizon.
"Cohesion Fund In its 2014–2020 Financial Framework, the European Commission improved funding opportunities for member states as part of the Cohesion Policy for environmentally oriented public goods and services." [26]

Cohesion Fund supports growth and development through gathering, internal urban unity and promotion of a more balanced, polycentric development. The Cohesion Policy supports cleanup or reuse of brownfields. European Regional Development Fund ERDF allows cities to receive funding for "taking action to

[22] Colsaet A., Yann L. and Levrel H., (2018), What drives land take and urban land expansion? A systematic review. Land Use Policy, 79, 339–349, 10.1016/j.landusepol.2018.08.017
[23] European Commission. (n.d.-d). A European Green Deal: Actions being taken by the EU. https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal/actions-being-taken-eu_en
[24] European Commission, (n.d.-e), Environmental liability. https://ec.europa.eu/environment/legal/liability/index.htm
[25] Morar C., Berman L., Unkart S., Erdal S.,(2021), Sustainable Brownfields Redevelopment in the European Union: An Overview of Policy and Funding Frameworks, J Environ Health, 2021 Nov, 84(4): 24-31, PMID: 35350129; PMCID: PMC8959022
[26] European Parliament, (2013), Regulation (EU) No. 1300/2013 of the European Parliament and of the Council of 17 December 2013 on the Cohesion Fund and repealing Council Regulation (EC) No. 1084/2006—Article 4 Investment priorities. https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013R1300&rid=7

improve the urban environment, to revitalize cities, regenerate, and decontaminate brownfield sites," [27] that said the ERDF funding directly mentions brownfields redevelopment.

4.2.7 The RESCUE project

The European RTD project RESCUE, Regeneration of European Sites in Cities and Urban Environments, for the first time integrates the principles of sustainability into brownfield regeneration, defining criteria for the sustainable regeneration of industrial brownfield sites in Europe.

The RESCUE project was started in March 2002 and it is a confederation of 14 partner institutions from France, Germany, Poland and the UK and it represents a wide range of different stakeholder interests and competences in brownfield regeneration. The project was concluded in 2005.
RESCUE project analyses strengths and weaknesses of brownfield regeneration and develops tools for the practical work of real estate owners, planners, architects, engineers and public authorities involved in the complex processes of brownfield projects and its principles and study is based on eight case studies in six industrial core regions from Europe: in France (Nord-Pas de Calais), Germany (Ruhr Area, South of Leipzig Region), Poland (Silesia) and the UK (Derbyshire, Tyne and Wear).

RESCUE for the first time developed a definition for "sustainable brownfield regeneration": "Sustainable Brownfield Regeneration is the management, rehabilitation and return to beneficial use of brownfield land in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generations in environmentally sensitive, economically viable, institutionally robust and socially acceptable ways within the particular regional context." [28]

The list below shows the sustainability objectives that have been elaborated by RESCUE and
Represent the criteria that have to be met by sustainable brownfield regeneration projects:

"Sustainability criteria for the management of contamination and the reuse of soil and debris:" [29]

1. To reduce negative environmental impacts on the site and on the neighborhood including human health risks
Environmental impacts that are arriving from the site such as harmful substances or noise can have negative effects on the health and well being of humans as well as plants and animals.

2. To minimise waste and maximise recycling and reuse of soil and debris
The recycling of construction and demolition waste (C&D waste)(if not hazardous waste) as well as soil (if not contaminated) can reduce the use of new materials in the brownfield redevelopment resulting also in reduction of cost and time. To obtain sustainable brownfield regeneration all the possible waste should be reused.

3. To ensure cost effectiveness and technical feasibility
The cost effectiveness and technical feasibility for sustainable brownfield redevelopment can be obtained by the point mentioned above. Reuse of soil, materials and good management of site contamination can have benefits to the economical and ecological aspects of the regeneration.

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[27] EUR-Lex Access to the European Union Law, (2013), Regulation (EU) No. 1301/2013 of the European Parliament and of the Council of 17 December 2013 on the European Regional Development Fund and on specific provisions concerning the investment for growth and jobs goal and repealing regulation (EC) No. 1080/2006.
[28] RESCUE Work Package 1,(2003), *Development of an Analytical Sustainability Framework for the Context of Brownfield Regeneration in France*, Germany, Poland and the United Kingdom, Project Deliverable
[29] Pahlen G., Glöckner S., (2006), "Sustainable regeneration of European brownfield sites" in *Brownfield Sites II*, Donati A., Rossi C. and Brebbia C.A., (Editors), 2004 WIT Press, www.witpress.com, ISBN 1-85312-719-1

4. To improve social acceptance through identification of all stakeholders and risk communication

All the process of the regeneration of brownfield should be available to the public to avoid miscommunication as well as to gain the public opinion on the ongoing project.

"The community is concerned not only with the benefits associated with redevelopment (reduction of risk to public health) but also by any potential impact encountered during the restoration process. The social acceptance will highly be related to the manner the risk is presented, interpreted and the level of trust the public places in the project actors. This good communication is a key point for the sustainability of the project." [30]

5. To provide decision support tools for risk based land management

Use of adequate tools like electronic data processing can help in management, communication or distribution of data. The use of tools can be cost and time efficient and can as well have a good impact on tasks like "risk assessment, process management, technical / economical optimisation or the management, concise presentation and visualisation of data. An objective for sustainable brownfield development is not only the use of available tools but also its intelligent application."[1]

Sustainability criteria for the management of existing buildings and infrastructures

1. To minimise energy demand and produce renewable energy on the site

"The consumption of energy is a major aspect in the context of sustainable development." [30]

The adaptation of renewable energy resources and modern energy standards in brownfield regeneration should be one of the priorities in sustainable regeneration especially if we are dealing with already existing buildings on the site which do not comply with present energy standards. Such buildings should be re adapted in a way to comply with the modern energy guidelines.

2. To minimise water demand and reduce wastewater production

The sustainable brownfield redevelopment should take into account the sustainable management of water demand and consumption. The reused and redeveloped buildings should provide the systems that can minimize the water consumption as well as reduce the water waste collection.

3. To minimise waste generation from buildings and civil infrastructure (optimising recycling and reuse)

The sustainable brownfield redevelopment should minimize the waste generation and apply recycling techniques in order to minimize the costs and redevelopment process. In order to provide sustainable waste management on the site it has to reduce general waste connection, improve recycling and avoid any hazardous waste.

4. To promote cultural and regional identity by industrial heritage

Most of the brownfield areas possess industrial buildings that have great architectural value and identity within the urban fabric. In order to provide sustainable brownfield regeneration industrial heritage buildings should be handled with great care and reuse them as far as possible in order to promote the identity of the site.

5. To find better ways to comply with health and safety regulations for reused buildings and infrastructures

Brownfield sites consist of buildings that were

[30] Pahlen G., Glöckner S., (2006), "Sustainable regeneration of European brownfield sites" in *Brownfield Sites II*, Donati A., Rossi C. and Brebbia C.A., (Editors), 2004 WIT Press, www.witpress.com, ISBN 1-85312-719-1

constructed to provide usually the industrial functions in order to redevelop and readapt these buildings they should comply with modern health and safety standards.

Sustainability criteria for land use and urban design on brownfield sites

1. To promote land use functions that match regional socio-economic demands and needs

"In sustainable brownfield regeneration projects, the intended land use function should fit into its general context and match the demands and needs of the respective region." [31]
The redevelopment of the brownfield should comply with the demands that are beneficial to the region and avoid the unused areas.

2. To integrate the reuse of brownfield sites into a regional land management

Brownfield redevelopment should be integrated into a regional land management in order to save resources of the spatial development. Regional land management should integrate into a systematic approach the monitoring, planning and implementation of regional development.
"Sustainable brownfield projects have to comply with the land management systems which are implemented in the respective regions." [31]

3. To integrate the reuse of brownfield sites into the urban development

The objective of this point is to promote a stable and balanced urban structure of different compatible uses in urban development, such as short distances between home, work and leisure. Mixed structures can contribute to the reduction of mobility demands and can have positive effects on the socio-economic stability and the quality of life within urban areas. The redevelopment of brownfield sites should follow an integrated urban development strategy and should fit into the respective social, economical, cultural and architectural urban fabric.

4. To achieve benefits for and prevent adverse impacts on the local neighborhood

The regeneration proposal for the site should comply with the local neighborhood. The regeneration project for the site should propose services and land use that are suitable for the area and enable the social, economic and ecological benefits and link the site with the neighborhood.

5. To generate and safeguard employment and economic development

The regeneration of the brownfields give the possibility to provide long term jobs by including commercial, industrial land use and provide a suitable amount of office in the area.

6. To promote land use functions that suit the natural and man-made environment of the site and its neighborhood

The redeveloped brownfield site should fit not only in socioeconomic context but also into a natural and man-made environment. The redevelopment of the site should consider the existing green areas, water conditions, topography of the site and possible contamination.

7. To save resources

"Saving resources is an important contribution to sustainable development. In the context of urban design several issues such as space, energy, water building material have to be addressed." [31]

8. To increase the permeability of former brownfield sites

Brownfield sites are usually gated infrastructures that do not let any access to the public,

[31] Pahlen G., Glöckner S., (2006), "Sustainable regeneration of European brownfield sites" in *Brownfield Sites II*, Donati A., Rossi C. and Brebbia C.A., (Editors), 2004 WIT Press, www.witpress.com, ISBN 1-85312-719-1

the redevelopment of these sites should consider the permeability of the site for the public and connection with the other parts of the area.

9. To provide access for all means of transport

"The redeveloped sites should be accessible for all means of transport in adequate measure (car, public transport, bike, foot, air, ferry, etc.) in order to open the planned land use for all population groups and abilities." [32]

10. To achieve high urban design quality

The redevelopment of the brownfield should have regard to saving the environment, creating a convenient neighbourhood, and keeping an identity and saving the cultural heritage in order to assess urban design quality and prove its sustainability. The development should save the existing structures but also include the change and create new suitable urban structures with high quality of the design.

11. To create and maintain flexibility and flexible urban design

The redevelopment and planning of the site should respond in a strategic way in fast moving social and commercial development. The new redevelopment should avoid fast demolition of the old structures and building the new ones in order to reduce the consumption of resources and adapt the project in a way that can anticipate the fast moving development.

"Flexibility in land use and architectural concepts can offer opportunities to react to future changes in the demand." [32]

Sustainability criteria for the management of brownfield projects

1. To adopt an interdisciplinary project team approach

The regeneration of brownfield sites should engage in the working and design process of all team members from all the different organizational boundaries. Integration, communication and coordination with all project members should be evident in order to succeed in preparation of the sustainable brownfield regeneration project.

2. To facilitate efficient project delivery

"Brownfield redevelopment projects are complex, multi-phase and multidisciplinary."[1] Constant monitoring and management of all the factors should be part of a brownfield redevelopment project in order to provide efficient delivery requirements. "All of this expertise must be encompassed within an overall vision of a holistic project that delivers the components of sustainable brownfield redevelopment." [32]

3. To promote and manage stakeholders participation

"Due to the multitude of activities that affect a great number of differing interests and intentions, stakeholder participation is a crucial factor for successful sustainable brownfield regeneration; it raises the acceptance of and satisfaction with the project and assists a smooth project delivery." [32]

In order to provide successful brownfield management the stakeholder participation should be involved in all the different phases of brownfield project regeneration.

4. To provide a framework for transparency in decisions, flow of information and improved communication structures

During brownfield redevelopment all the

[32] Pahlen G., Glöckner S., (2006), "Sustainable regeneration of European brownfield sites" in *Brownfield Sites II*, Donati A., Rossi C. and Brebbia C.A., (Editors), 2004 WIT Press, www.witpress.com, ISBN 1-85312-719-1

decisions made by project managers should be communicated in a clear way and the decisions should be demonstrably defensible and justifiable.

5. To protect human health and safety during field work

The brownfield regeneration sites during the working process should comply with health and safety regulations in order to guarantee a trouble-free building process for people working on site.

6. To adopt an approach that integrates social, economical and environmental aspects

"The inherent complexity of the brownfield redevelopment process requires an integrated approach to tackle all dimensions of sustainability in a well balanced manner." [33]

SUMMARY

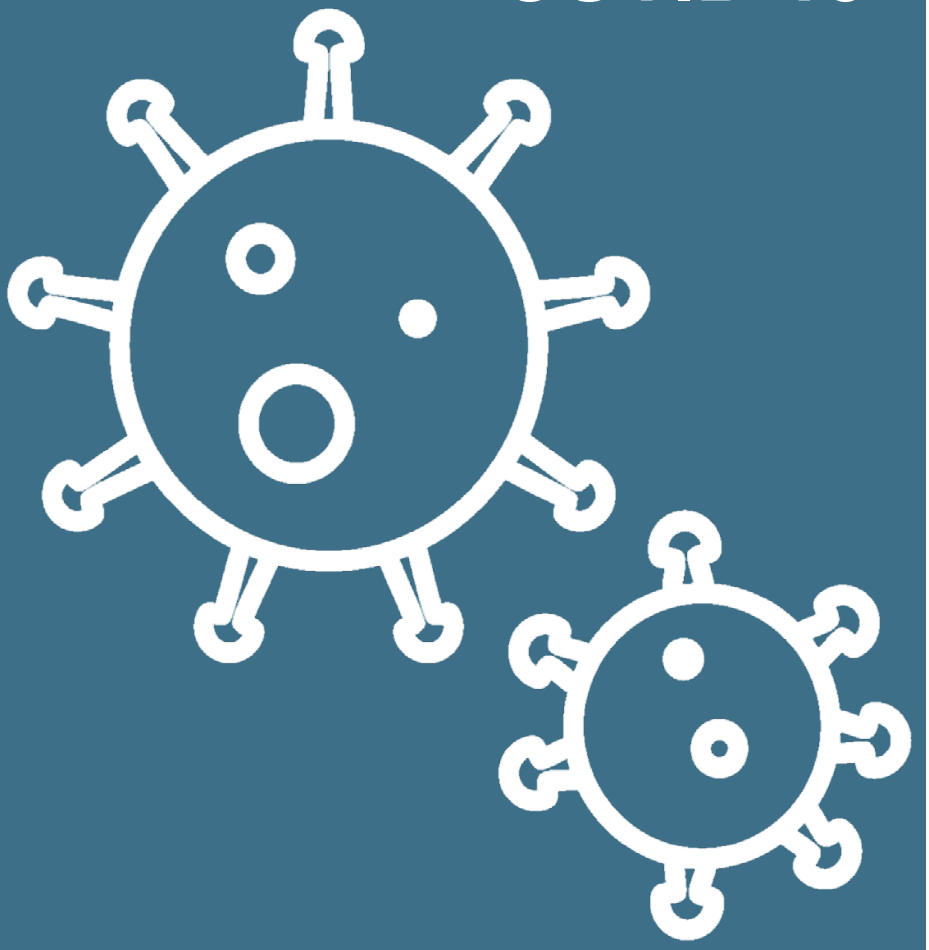
Rapid urbanization and urban sprawl is the biggest threat in future development of cities. Since most of the post-industrial sites are located near the city center or within the city barriers the redevelopment of brownfields areas can limit the urban sprawl and refine the environmental quality of the cities, limit the development of greenfields and have at the same time economic and ecological benefits. The proximity of these sites can also contribute to reduction of greenhouse gasses emissions through shorter distances in commuting within the city and reducing the usage of cars.

Unfortunately there is no one common, specific rule for dealing with brownfields areas in Europe in terms of mitigating climate change. Brownfields remediation, however, is a 2014–2020 EU priority that is incorporated in several policies, such as the 2030 Sustainable Development Goals and Agenda. There are few European Union policy frameworks that are related to the redevelopment of the brownfield areas that mention the necessity and importance of sustainable redevelopment of brownfield areas.

In 2002 the RESCUE project was launched in order to integrate the principles of sustainability into brownfield regeneration, defining criteria for the sustainable regeneration of industrial brownfield sites in Europe. The RESCUE project was a confederation of 14 partner institutions from France, Germany, Poland and the UK and it represented a wide range of different stakeholder interests and competences in brownfield regeneration. Unfortunately the project was concluded in 2005 and did not result in any continuation or update considering future trends in urban regeneration.

[33] Pahlen G., Glöckner S., (2006), "Sustainable regeneration of European brownfield sites" in *Brownfield Sites II*, Donati A., Rossi C. and Brebbia C.A., (Editors), 2004 WIT Press, www.witpress.com, ISBN 1-85312-719-1

COVID-19



4.3.1 Covid - 19 overview

"The World Health Organization (WHO) on March 11, 2020, has declared the coronavirus (COVID-19) outbreak a global pandemic. WHO Director-General, Dr. Tedros Adhanom Ghebreyesus said that the WHO is "deeply concerned both by the alarming levels of spread and severity and by the alarming levels of inaction," and he called on countries to take action now to contain the virus." [34]

The outburst of covid 19 pandemic had significantly changed our lifestyle and the use of open spaces in cities. The effects of Covid-19 pandemic and the lockdown on urban spaces can not be passed unnoticed and can strongly influence the future development of planning of cities and urban spaces.

"Throughout history, pandemics have always shaped cities; many health issues have been reflected on architecture and urban planning. Today, the world faces a public health crisis of COVID-19 pandemic." [35]

Looking in the past we can notice that Covid-19 was not the first world's pandemic, in fact there were many other pandemics that affected millions of lifes and had impact on the health sector but also had their consequences in urban development and huge impact on economics.
" World pandemics change the image of cities and public spaces into empty environments, but mostly after the end of the crisis; it requires a change in the city's shape to integrate between community health practices and social thinking into urban design." [35]
As an example we can talk about the black death that spread among Europe in the 14th century. The black death crisis affected the urban design of European societies and encouraged the opening of larger public spaces which would provide a greater opportunity to connect with nature and reduce the feeling of isolation.

In the 19th century during the second industrial revolution between 1870-1914, was an important phase of unprecedented urbanization. "During these days; cities became densely populated, full of tall residential buildings, railways, transportation, and public spaces for entertainment and welfare." [36] After that, between 1918-1919; the deadliest respiratory virus Then between 1918-1919 "Spanish Flu pandemic" that was the most serious respiratory virus killed almost 50 million people worldwide. This pandemic had a high impact on urban development, it slowed down urban growth and limited public life for a long period of time in order to limit the spread of disease.
"As a result, public transportation had been replaced by walking in uncrowded streets, most of the population were staying at home, and sidewalks at night were unusually clear. " [37]

The Covid-19 pandemic caused massive lockdowns all over the word and changed immensely the usual life of the cities. Some lockdown measures were applied just to some neighborhoods but mostly to entire cities or provinces. All groups of people regardless of age were allowed to leave their homes only at certain time intervals and at certain distances. Places like green/natural urban areas, beaches, parks, and urban forests could be entered just by a limited amount of people or were completely restricted.
"The last measure, in particular, caused a lot of controversy and raised opposition, having regarded that green space provides health safeguarding and the much-needed stress relief." [38]

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[34]https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020
[35] ELTARABILY SARA , ELGHEZNAWY DALIA, (2020), Post-Pandemic Cities - The Impact of COVID-19 on Cities and Urban Design, Architecture Research 2020, 10(3): p: 76 Digital: http://article.sapub.org/10.5923.j.arch.20201003.02.html
[36] Crosby, A.W., America's forgotten pandemic: the influenza of 1918. 2003: Cambridge University Press.
[37] Michigan, U.o.M.C.f.t.H.o.M.a., The american influenza epidemic of 1918-1919, in Influenza Encyclopedia; A Digital Encyclopedia Reviewed May 4, 2020, Michigan Publishing, University of Michigan Library: A Digital Encyclopedia. [18] Rinde, M. How Philly's neighborhoods can help us understand pandemics. WHYY, Coronavirus Pandemic March 26, 2020 March 26, 2020
[38] Olivera Lekić Glavan ,Nenad Nikolić ,Branislav Folić ,Biljana Vitošević, Aleksandra Mitrović and Saja Kosanović, (2022, February), COVID-19 and City Space: Impact and Perspectives from: https://www.mdpi.com/2071-1050/14/3/1885/htm

The basic human need for others and for nature has been greatly challenged by the COVID-19 pandemic. Except for the periods of lockdowns and the restricted use of open public space " [39], citizens from all over the world have been opting to spend more time outdoors in comparison with the pre-pandemic time. [40] 'Life between buildings' [42] has gained an additional relevance, and the culmination has been reached with increased value of the private open space, providing for "invaluable safety from the epidemic and the mental comfort which is indispensable during isolation". [42] "The pandemic has revived the health- and wellbeing-related benefits of open space. The extension of crisis duration reinforces the significance of common open space, and increases the likelihood of changes in future design requirements. Similarly, existing open places in cities will likely be subjected to the transformation, both in terms of spatial physical characteristics and the offered contents, as the pandemic revealed their current weaknesses such as insufficient area, uneven distribution, or unequal accessibility to green areas." [43]

"The majority of researchers studying the effects of COVID-19 on urban environments agree that the preservation of high urban density in the post-pandemic time will simultaneously require both the densification and the diversification of urban contents, in order to regulate connectivity and mobility, and to prevent overcrowding in open and closed spaces." [43]

"To that end, the leading emerged concept of pandemic-resilient spatial organization refers to mixed land-use planning, substitution of spatial models of concentration with the models of dispersion, and the design of multifunctional spaces and places." [44]

"Reduced mobility and the increased range of home-based activities, such as distance working and online shopping, likewise raise the need for third social places within the neighborhoods. " [45] The examples of proposed mixed-use neighborhoods feature a combination of functions, from residential, to commercial, to industrial, to recreational, to social.

In order to obtain this goal of the mixed use areas is to provide flexible, transformative, and responsive to changing needs and new potential crises urban neighborhoods. The great potential lies in dismissed industrial areas that are often located between urban infrastructure and easy to reach by any means of transport. Brownfield sites can give great opportunity for new, redeveloped mixed use spaces as we can find in the example of the ongoing redevelopment plan of the former power plant of the Karol Scheibler Cotton Products Society in Łódź into mixed use residential, office, commercial and service complex. (see chapter 6 page 150)

[39] Honey-Rosés, J.; Anguelovski, I.; Chireh, V.K.; Daher, C.; Konijnendijk van den Bosch, C.; Litt, J.S.; Nieuwenhuijsen, M.J. The impact of COVID-19 on public space: An early review of the emerging questions—Design, perceptions and inequities. Cities Health 2020, 1–17.
[40] Holmes, E.A.; O'Connor, R.C.; Perry, V.H.; Tracey, I.; Wessely, S.; Arseneault, L.; Ballard, C.; Christensen, H.; Cohen Silver, R.; Everall, I.; et al. Multidisciplinary research priorities for the COVID-19 pandemic: A call for action for mental health science. Lancet Psychiatry 2020, 7, 547–560.
[41] Gehl, J. Life between Buildings: Using Public Space, 6th ed.; Island Press: Washington, DC, USA, 2011
[42] Jasinski, A. Public space or safe space—Remarks during the COVID-19 pandemic. Tech. Trans. 2020, 117, e2020020.
[43] Olivera Lekić Glavan ,Nenad Nikolić ,Branislav Folić ,Biljana Vitošević, Aleksandra Mitrović and Saja Kosanović, (2022, February), COVID-19 and City Space: Impact and Perspectives from: https://www.mdpi.com/2071-1050/14/3/1885/htm
[44] Shift, Architecture, Urbanism. Hyperlocal Micromarkets in Shutdown Realities. Available online: https://www.shift-au.com/ projects/hyperlocal-micromarket/ (accessed on 19 December 2021).
[45] Shen, J. The Rise of the Third Space: Post-Pandemic, Flexibility Is Key to the Future of Real Estate. Available online:https://www.withersworldwide.com/en-gb/insight/the-rise-of-the-third-space-post-pandemic-flexibility-is-key-to-thefuture-of-real-estate (accessed on 17 December 2021).

4.3.2 15 minutes cities concept

As Covid-19 pandemic striked urban planners came back to the idea of a 15-minute city. It is not a new idea, it was a term made in 2016 by Carlos Moreno, scientific director and professor specializing in complex systems and innovation at University of Paris.
Before Covid-19 pandemic the commuting in cities was mostly by means of cars, everyday citizens had to commute to the workplace, schools or shops. During lockdown the movement of inhabitants of cities was very restricted, sometimes just to move within your block, people were allowed to leave their homes only at certain time intervals and at certain distances. The limitation in commuting brought to the surface some significant problems that people had to face such as lack of important facilities or services in their neighborhood.

"Before innovations such as the use of virtual communication options, cities that were partially or totally locked down experienced unprecedented challenges such as the shortage of basic supplies such as food. A sizable number of urban residents also faced unemployment as companies and institutions downscaled due to the low demand and supply of basic materials and services." [46] The emergence of this pandemic exposed the vulnerability of cities in their current establishment and the need for a radical re-thinking, where innovative measures need to be tailored to ensure that urban residents are able to cope and continue with their basic activities, including cultural ones, to ensure that cities remain both resilient and livable in the short and long terms." [47]

Due to these rising issues Covid-19 pandemic and lockdown popularized the concept of a 15-minute city. The concept is about planning housing developments according to the simplest conceivable principle of proximity. Instead of commuting to the other distant parts of the city to fulfill basic needs, you place these services closer together so that it is immediately available and transport is unnecessary.

The main goal of the 15-minutes city concept is that as many daily necessities as possible are available on foot or by bike around the place of residence, including also open spaces and green belts to connect with nature and reduce the feeling of isolation.

"15-minute cities meet two pandemic conditions simultaneously: they hinder individual infections and limit the range of infection centers, because they favor physical activity and the ungrouping of communities through a polycentric structure of services, including green services, available thanks to the effort of their own muscles." [48]

During the pandemic of Covid-19 the idea of a 15 minutes city model came back to the surface.
A lot of the cities all over the globe adopted a total lockdown where commuting anywhere was reduced almost to zero and all the essential needs had to be satisfied within our home neighborhood. The use of public transport was also reduced to a minimum and forced some people to look for other alternatives to commute to work.
"Cities around the world have shown their agility by deploying hundreds of kilometers of bike lanes, expanding restaurant terraces in spaces reserved for parking, and rolling out green initiatives in neighborhoods." [49]
Covid-19 pandemic definitely accelerated the introduction of the 15-minute city in many cities, thanks to the rediscovery of proximity, the

[46] Allam Z., (2020), *Surveying the Covid-19 Pandemic and Its Implications: Urban Health, Data Technology and Political Economy*; Elsevier Science: Amsterdam, The Netherlands
[47] Moreno C., Allam Z., Chabaud D., Gall C., Pratlong F., (2021), Introducing the "15-Minute City": Sustainability, Resilience and Place Identity in Future Post-Pandemic Cities, Smart Cities, 4, 93-111, 10.3390/smartcities4010006
[48] Skrzypek M., (2020) "Wirus urbanista" in *Miasta Wobec Wyzwań Przyszłości*, Wolność i Solidarność nr 87,p.45-50, Gdańsk
[49] Moreno C., (2020), *Living in proximity, the 15-minute city in Tackling climate emergency*, Dossier, N117-JAN 21
https://www.barcelona.cat/metropolis/en/contents/living-proximity-the-15-minute-city

use of active mobility and the strengthening of social ties.
For this reason C40 mayors have integrated the 15-minute city in the common agenda adopted to emerge from the crisis and to bring about ecological recovery. The aim of this agenda was to make the city more resilient, liveable and inclusive.
“Mayors are taking action to implement urban development policies that foster proximity, active mobility and the rolling out of public service facilities that are close to residents.”[50]
“Among the first strong promoters of the 15-minute city concept was the Mayor of Paris, A. Hidalgo, whose electoral strategy “Ville du quart d’heure”, ahead of the successful 2020 elections, included key ideas based on the 15-minute city concept.” [51]

The aim of the mayor of Paris, Anne Hidalgo, was to create a city of closeness that requires proximity and solidarity among residents, their participation, and an emphasis on green solutions.
Among the interventions that she supported were: “banning the use of high-emission vehicles in the city, handing over the Seine to pedestrians and cyclists, creating green mini-gardens in the city’s tissue (for example, more than 40 Parisian schools have transformed their properties into green oases). Since the pandemic, 50 km of bicycle paths have been built and the area around the Bastille has been renovated.” [52] The city reclaimed several public spaces during the pandemic that were initially dominated by cars. During the pandemic, the city allowed cafés and bars to take up to 3 parking spaces and create a summer terrace.

Similar initiatives are being undertaken by: Madrid, Ottawa, Milan, Seattle, Stockholm and Sydney.

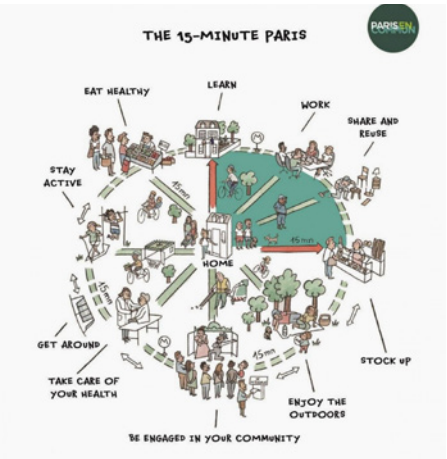

Fig.31 Moreno’s ideas are being implemented in Paris. The drawing is by Micael

4.3.3 Four principles of 15 minutes city framework of Carlos Moreno

The concept of 15-minutes city that is introduced in article by Carlo Moreno and Allam Z., Chabaud D., Gall C. and Pratlong F. (Introducing the “15-Minute City”: Sustainability, Resilience and Place Identity in Future Post-Pandemic Cities) is based on so- called “chrono-urbanism”. Chrono-urbanism emphasizes that the time spent on transportation is not balanced with the quality of urban life.
The concept of 15-minutes city was initiated by Carlos Moreno in 2016 to which he came back again in 2021 where he reintroduced the 15-minute city concept in the article. In his new concept of 15-minutes city C.Moreno introduces how the urban residents of a 15-minutes neighborhood can fulfill six essential functions within a 15-minute walk or bike from their dwellings: ”living, working, commerce, healthcare, education and entertainment.”[55] In order to acquire these functions the 15-minutes neighborhood, according to Moreno, should comply with four main components that build the framework for a 15-minutes city: PROXIMITY, DIVERSITY, DENSITY and DIGITALIZATION.” [53]

[50] Moreno C., (2020), *Living in proximity, the 15-minute city in Tackling climate emergency*, Dossier, N117-JAN 21
https://www.barcelona.cat/metropolis/en/contents/living-proximity-the-15-minute-city
[51] Mocák P., Kvetoslava B., Matlovic R., János D., Pachura P., Prabuddh M., Kostilníková K., Demková M., (2022), *15-Minute City Concept As A Sustainable Urban Development Alternative: A Brief Outline Of Conceptual Frameworks And Slovak Cities As A Case*,64, 69-89
[52] Mayer A., (2021)*15-minutowe miasta naszą przyszłością?*
https://siedemosmych.pl/15-minutowe-miasta-nasza-przyszloscia/

"The four dimensions were identified after observing the challenges that different cities across the globe endured during the height of widespread cases of COVID-19 and the subsequent health measures and protocols that ensued aimed at mitigating the spread." [53]

Density

In urban planning density is usually defined as physical infrastructure and urban form where the concept of 15-minutes city is perceived in terms of people per kilometer square. The density concept is strongly related to diversity formwork and travel in 15-minutes city concept.

In the 15-minutes neighborhood density provides the urban development of bike lanes or sidewalks that reduce the use of cars.

"The space can be effectively planned if planned with optimal density so that all the essentials could be accessible to residents without the need for time and energy-consuming automobiles. " [54]

Through the concept of density in 15-minutes neighbourgoods could create the solutions such as renewable energy resources, food supply or use spaces in neighborhood for multiple purposes for example "school playgrounds could be used as parks." [55]

"Density allows for equity in addressing the specific needs of different areas, including communities of varying economic status, while particularly favoring the disadvantaged,

Fig.32 The 15-minutes City framework, by Moreno C., Allam Z., Chabaud D., Gall C., Pratlong F. in *Introducing the "15-Minute City": Sustainability, Resilience and Place Identity in Future Post-Pandemic Cities*

[53] Moreno C., Allam Z., Chabaud D., Gall C., Pratlong F., (2021), *Introducing the "15-Minute City": Sustainability, Resilience and Place Identity in Future Post-Pandemic Cities*, Smart Cities, 4, 93-111, 10.3390/smartcities4010006

[54] Salingaros A., (2006), "A Compact city replaces sprawl" in *Crossover: Architecture*, Urbanism, Technology; 010 Publishers: Rotterdam, The Netherlands, pp. 100–115

[55] Reid C., Anne Hidalgo to Make Good on Pledge to Remove Half of City's Car Parking Spaces Digital: https://www.forbes.com/sites/carltonreid/2020/10/20/paris-mayor-anne-hidalgo-to-make-good-on-pledge-to-remove-half-of-citys-car-parking-spaces/?sh=4a7854f616ec

especially through the equitable distribution of civic services and in the deployment of services at a reduced cost for cities, rendering higher value for both investors and governments." [56]

Proximity

The proximity in 15-minutes neighborhood is strictly connected with the accessibility of residents; it allows them to quickly access all the basic services that are needed. This dimension can reduce the commuting of residents hence reducing the traveling time and emissions, which brings positive aspects into environmental and economic impacts.

Moreno describes this dimension as "critical as it allows residents to transition from residential areas, work, commercial areas, education centers, health facilities and other basic institutions in a reduced timespan." [57]

Proximity grants the possibility for residents to access all services, commercial spaces, entertainment spaces which at the same time increase the living comfort and satisfaction. Spaces can be used in a multipurpose way so that proximity can allow the highest exploitation of public areas or green spaces.

Ultimately, this closeness of essential services allows residents to enjoy better service provision both in commercial and public establishments, as the planning model allows for multimodal use of basic infrastructures.

The concept of multipurpose spaces is highly present in the concept of 15-minutes city embraced by the mayor of Paris, Anne Hidalgo where she promotes the ideology of Moreno and permits ideas such that "school playgrounds can be transformed into parks that the public are free to access after school hours." [57]

"This premise is important as it allows one to envision a city through a different perspective, more tailored to the human scale and adaptable to the use of its residents." [57]

Diversity

"Diversity in the context of the above frame and in the advancement of the 15-Minute City concept is twofold: (i) the need for mixed use neighborhoods which are primary in providing a healthy mix of residential, commercial and entertainment components and (ii) diversity in culture and people." [57]

Mixed-use neighborhoods are the solution for the diversity in 15-minutes city by providing a variety of housing for all types of residents and promoting equality in the urban environment. That said density and proximity are the major elements of mixed-use neighborhoods where all the necessary amenities are provided by means of sidewalks and bike paths. All three dimensions density, proximity and diversity guarantee that all the residents can sustain their basic needs within the neighborhood.

"Diversity aids in ensuring that the sanctity of available public spaces is preserved and upheld and, where possible, that opportunities for creating more public areas are savored." [58]

"Diversity in a neighborhood provides city governments with opportunities to concentrate on improving their service delivery to locals and, in turn, promotes the livability status, maintains property value and enhances community participation and interaction." [59]

Diversity factor corresponds not only in the diversity of urban infrastructures but also in the cultural diversity. A variety in multicultural neighborhoods can have great profitability in city economics but also bring to the neighborhood diversity in cultural products and cultural heritage.

Having a diverse neighborhood would also bring visitors from other parts of the city or world hence "promoting tourism and other related businesses are essential in creating new business and promoting economic vibrancy, leading to the creation of increased employment Opportunities." [60]

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[56] Sisson P., *What is a 15-Minute City?* Digital: https://citymonitor.ai/environment/what-is-a-15-minute-city

[57] Moreno C., Allam Z., Chabaud D., Gall C., Pratlong F., (2021), *Introducing the "15-Minute City": Sustainability, Resilience and Place Identity in Future Post-Pandemic Cities*, Smart Cities, 4, 93-111, 10.3390/smartcities4010006

[58] Whyte W.H., (1990) *City: Rediscovering the Center,*Doubleday: New York, NY, USA

[59] Brookfield K., (2017), *Residents' preferences for walkable neighborhoods*, J. Urban Des. 2017, 22, 44–58

[60] Rodríguez-Pose A., von Berlepsch V., (2019), *Does population diversity matter for economic development in the very long term? Historic migration, diversity and county wealth in the US*, Eur. J. Popul. 2019, 35, 873–911

Digitalization

As mentioned in the study of Moreno, digitalization "aligns closely with the Smart City concept from which the 15-Minute City concept can be argued to have, in part, drawn its inspiration." [61]

"Within the Smart City concept, factors such as inclusivity, resident participation and real-time delivery of services are encouraged through varying platforms-including digital." [62]

Smart cities concept as well as 15 minutes city should focus on accurate distribution of different technologies in order to reach ine integrity of residents and allow the delivery of services in no time.

Moreno explains that "through digital tools and solutions" [61] the services such as bike sharing, cycling etc. could gain more value and upgrade the whole experience, it could also "ensure the safety and security of cyclists." [61]

Moreover the digitalization of the 15-minutes city could reduce time in commuting to reach specific services by implementing online shopping, cashless transactions and virtual communications and interactions.Through digitalization of neighborhoods all the needed services could be delivered to our homes or workplaces. During the pandemic of Covid-19 the digitalization pillar is one of the most important ones among the 15-minutes city concept framework, people were forced to stay home and study and work remotely using their digital tools and internet. This crisis emphasizes the possibility of working at home without traveling to the office which can significantly reduce the need for time travel consumption and result in better economic results.

Digitalization in 15-minutes city allows us to sustain most of our needs and gives us the possibility to work or study without living in our home or neighborhood.

4.3.5 15 minutes city debate-Carlo Ratti and Richard Florida

The idea of a 15 minutes city could be an ideal solution for urban development of European cities. The concept introduces the mixed use developments, where residences, schools and shops stand side by side in diverse neighborhoods. The 15 minutes city concept arose again in the era of pandemic but it also indicated other benefits that we could aspire from planning cities in terms of small neighborhoods where you can satisfy all your needs in 15 minutes walk. The 15-minute city aims to reorganize physical space in the city. Each neighborhood becomes an "isochrone" [63] – an area that can be explored within the same amount of time – giving all residents access to all the necessities of daily life – stores, schools, workplaces, doctor's offices, parks, libraries, restaurants and other amenities that are located in a short 15-minute walk or bike ride from home. The basic pillars of the 15-minute city could also play a role in improving the air quality and in reduction in the emissions of greenhouse gasses and other benefits in cities that can be accomplished through three additional dimensions (density, diversity, and digitalisation).

The concept of 15 minutes city seems perfect for urbanization of cities, environment and social development yet to create fully 15 minutes cities is probably impossible.

This concept arose in an important debate by Carlo Ratti and Richard Florida who clarify the concept of 15 minutes city and specify the new concepts that could change their way of rethinking the cities.

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[61] Moreno C., Allam Z., Chabaud D., Gall C., Pratlong F., (2021), *Introducing the "15-Minute City": Sustainability, Resilience and Place Identity in Future Post-Pandemic Cities*, Smart Cities, 4, 93-111, 10.3390/smartcities4010006

[62] Dembski F., Wössner U., Letzgus, M., Ruddat M., Yamu C., (2020), *Urban digital twins for smart cities and citizens: The case study of Herreberg, Germany*, Sustainability 2020, 12, 2307

[63] Ratti C., Florida R., (2021), *'15-minute cities' are now all the rage, but are they ultimately limiting?*, Independent, 17 October 2021 Digital: https://www.independent.co.uk/voices/covid-city-commute-urban-planning-b1939577.html

The basic pillars of the 15-minute city could also play a role in improving the air quality and in reduction in the emissions of greenhouse gasses and other benefits in cities that can be accomplished through three additional dimensions (density, diversity, and digitalisation).
The concept of 15 minutes city seems perfect for urbanization of cities, environment and social development yet to create fully 15 minutes cities is probably impossible.
This concept arose in an important debate by Carlo Ratti and Richard Florida who clarify the concept of 15 minutes city and specify the new concepts that could change their way of rethinking the cities.

"The reality is that urban life requires the broad expanse of entire cities and metro areas. And it is impossible to replicate some of the most important institutions – great universities, great museums, great theaters – at a neighborhood scale. Cities thrive because they create a market for these incredible institutions and assets.

We might visit the coffee place on our block every day, but we'll only take the subway to the museum or theater once a month. Indeed, research by one of us published recently in Nature, shows that in everyday life, the frequency of our visits to a given location is inversely proportional to its distance from our homes.

Instead of a complete 15-minute city, we propose something akin to a "15-minute baseline". That more circumscribed term can serve to remind us of the important fact that the truly vibrant parts of the city often begin when the first 15 minutes end. With easy access to the essentials, we can save our longer trips for where we need them; to encounter and participate in that diversity and specialization that are only possible at the scale of a real city and metro area.

Great neighborhoods are incomplete by definition, functioning as proverbial stepping stones or starting places from which residents can strike out further. Great neighborhoods are never self-contained but are always an outgrowth and function of great cities." [64]

To build cities just with 15 minutes neighborhood is difficult, cities are shaped by big infrastructures such as universities, theaters, cinemas or historic city centers as in we can see in all european cities and as mentioned by Carlo ratti and Richard Florida it is impossible to replicate those institutions and spaces at a neighborhood scale. The more efficient way is to plan cities in a way that all our basic needs and essentials can be reached by 15 minutes walk or bike ride where with the spare time that we saved we can commute to more attractive parts of the city.

4.3.6 Covid-19 Pandemic Adaptation Strategies - 15-minutes city model in the case of Milan

"In Italy, the Lombardy Region was one of first areas in Europe that was dramatically hit by the Covid-19 outbreak and lockdown restrictions were hence imposed in several months in 2020: many were forced to stay within the borders of their own neighborhood." [65]

The global pandemic and lockdown reintroduced the idea of 15-minutes city and let the existing visions to integrate in urban development such as proximity, mixed-use neighborhoods with blended uses, shops, new office layouts with shared workstations, coworking and co-living spaces, innovative technologies used in the area or sustainable mobility. During the pandemic the availability of private/collective outdoor living spaces and public open spaces became very valuable in order to

[64] Ratti C., Florida R., (2021), *'15-minute cities' are now all the rage, but are they ultimately limiting?*, Independent, 17 October 2021 Digital: https://www.independent.co.uk/voices/covid-city-commute-urban-planning-b1939577.html
[65] Pinto F., Akhavan M.,(2022) *Scenarios for a Post-Pandemic City: urban planning strategies and challenges of making "Milan 15-minutes city"*, Transportation Research Procedia, Volume 60, ISSN 2352-1465, p: 370-377

enjoy social life. The importance of remote working as well as the flexibility of both working and living spaces became the crucial element in developing 15-minutes city.
Despite the rising emergency and growing restrictions, the Covid-19 pandemic raised the opportunity for redevelopment and rethinking of many European cities where among them we can identify Paris where Paris' mayor launched the plan "Paris Ville du quart d'heure" to adapt the 15-minute city concept during the peak of the Covid emergency or Milan where the municipal administration published the document "Milan 2020 Adaptation Strategy", in May 2020, open to public contribution to develop strategies to confront the so-called "Phase 2".

The "Milan 2020 Adaptation Strategy" document is also referring to a new project for the "15- minutes city" where the focus is put on the strategic reorganization of the times and spaces of the city and propose following goals: " the redefinition of the use of streets and public spaces, the increase in cycling and walking, the rediscovery of the neighborhood dimension, to experience the city differently, without the fear of creating crowds." [66]

The rising strategies weren't new for the urban development of Milan even before the Covid-19 pandemic. In 2018 the municipality of Milan promoted the project 'open piazza in every neighborhood' that supported the development of sustainable mobility, urban regeneration or increased the development of public spaces.
"By 2019, with the collaboration of citizens, 65 open piazzas intervention proposals were received and are currently in the co-design phase." [66]
The new strategies for the urban development of Milan were pointed towards rethinking the dimension of the neighborhoods in accordance with the principles of 15-minutes city.

The main objective was to have all essential proximity services available within small distances within 15-minutes walk or ride on bike. The strategies to be applied to make neighborhoods truly liveable, listed below were elaborated by Pinto F. and Akhavan M. in *Scenarios for a Post-Pandemic City: urban planning strategies and challenges of making "Milan 15-minutes city"*:" [66]

- Strengthening public services with a view to proximity, balancing the differences between neighborhoods and reducing travel.
- Expansion of the temporal spaces where public and private services are provided.
- Promoting digitalisation, collaboration, and inclusion at the neighborhood scale.
- Creating and improving local healthcare services.
- Promoting home deliveries through local and neighborhood bases commercial networks.
- Improving the security equipment of public offices and the management of access through reservations.
- Redesigning the services developed about the best experiences of other urban realities." [66]

In their research they compared the areas of the city of Milan based on eight services: schools, health, mobility, greenery, cultural offer, sport, etc.
The district with the most services (proximity to vehicles, health facilities, schools and universities, green spaces, sports facilities, museums, etc.) within a 15-minute walk was Porta Vigentina-Porta Lodovica followed by Bicocca and Città Studi and San Siro and Bisceglie.
Porta Lodovica and Bruzzano excel in the presence of health services, while San Siro offers sports activities and Pagano contains quality properties.

[66] Pinto F., Akhavan M.,(2022) *Scenarios for a Post-Pandemic City: urban planning strategies and challenges of making "Milan 15-minutes city"*, Transportation Research Procedia, Volume 60, ISSN 2352-1465, p: 370-377

Through the analysis of the studied research it is visible that the redevelopment and rethinking of European cities is necessary and it should focus on redeveloping the cities on the human scale. By adapting 15-minutes city and allowing the great proximity to services within the neighborhood can make the living in cities more simple and enjoyable.

In the conclusion of the research by Pinto F. and Akhavan M. in Scenarios for a Post-Pandemic City: urban planning strategies and challenges of making “Milan 15-minutes city” it is mentioned that in order to implement 15-minutes city for example in the case of Milan (Italy), simplified territorial planning and a general rethinking of the location of some collective functions, both public and private, is necessary.
It is also important to reuse abandoned buildings to offer adequate spaces for culture, new forms of entrepreneurship and strengthen public health safeguards.

The principle of 15-minutes city is not to create the so-called gated communities that are closed and disconnected from the city but to bring back diversity to the city structure. 15-minutes city brings the opportunity to create a single urban area composed of diverse districts, connected by sustainable mobility networks, and equipped with public and collective green space.

The 15-minutes model seems to be an ideal concept for redeveloping European cities although not every European city is the same. Each country and city has its own rules and its own specific urban structure. The implementation of all the framework of the 15-minutes city in the specific city is almost impossible. There is still a lot of uncertainty and ambiguity in the whole concept.

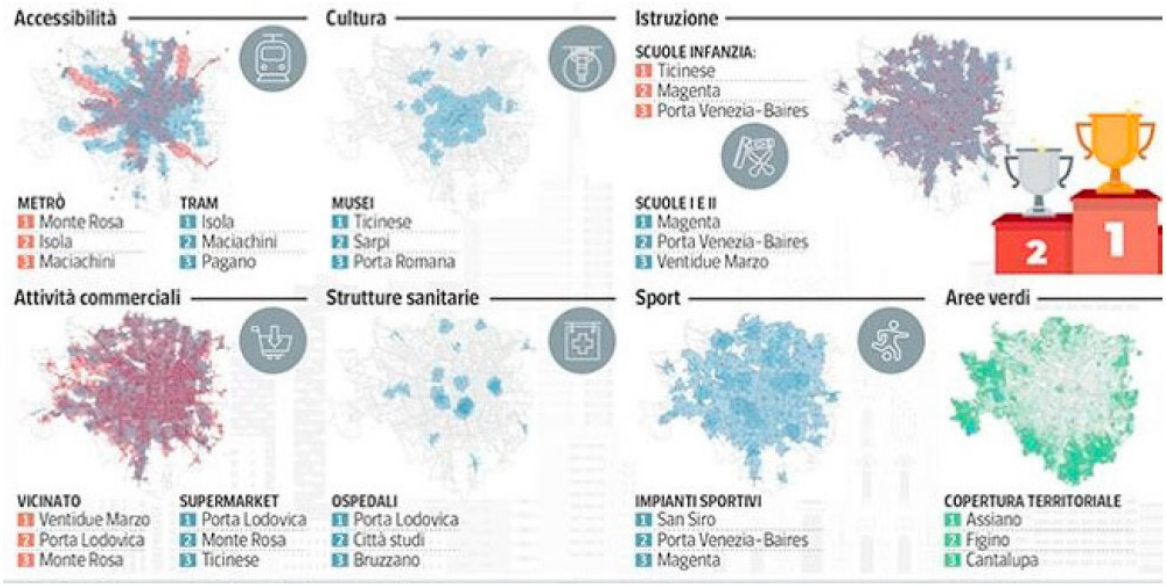

Fig.33 Milan. The ranking of areas that have services 15 minutes away. Source: Scenari Immobiliari

In the study of TeMA - Journal of Land Use made by Abdelfattah L., Deponte D., and Fossa G., - "*The 15-minute city as a hybrid model for Milan" they proposed a so-called hybrid 15-city model that is discussed on the basis of the case of Milan.*
It introduces following issues:

"A net-zero open neighborhood:" the aim of this pillar of proposed hybrid 15 minutes model is to create self-sufficient energy and recycling neighborhoods for water and waste and local food production through community gardening initiatives for providing 0-km food. At the same time the idea is to create permeable communities through pedestrian and green connections in order to avoid the generation of closed, gated neighborhoods and create the mix of social and urban environments. The idea of hybrid 15 minutes model also encourages the regeneration of dismissed or unshaded areas that could offer great potential for integrating different urban character.

"A glocal hybrid:" this aspect focuses on the mobility factor of the 15-minute city model. In the proposal for hybrid 15-minutes proposed by authors the model does not discharge the commuting on the contrary it is required as an essential part of the 15-minutes city neighborhood to provide public mobility services. Commuting within the city and neighborhood should be more flexible in space and time. The solution could be to provide more adequate services within neighborhoods such as coworking offices etc.

"Home & work:" the principle of this point is to create a blended living and working environment where the severance between home and work could be more blurred - "The hybrid neighborhood community is made by both inhabitants and users; in particular, some workers commute into and out of the neighborhood, some work from home and others work in their neighborhood co-working spaces." [67]
In order to achieve this home-work model the idea is to introduce more co-working or innovative urban manufacturing or traditional office spaces as one of the main services in the neighborhood. The hybrid 15-minutes city model should not only consider the time spent to reach services from home in 15 minutes but

also to reach the workplace in a short amount of time.

"Walking versus cycling versus the car:" "15 minutes of walking is different from 15-minutes of cycling" [67] - the idea of this principle in the hybrid 15 minutes model is to allow the inhabitants to be able to reach all their needs just using pedestrian paths, bike lanes or other sustainable mobility modes. This would reduce the use or need of cars which could lead to the need of fewer parking spaces. Cars parked in neighborhoods occupy a lot of space especially in big cities such as Milan, parking lots are occupied by cars of neighborhood residents, parked for the most of the time and are one of the causes of the urban heat island effect. By the reduction of car use the 15-minutes neighborhoods could reclaim a relative amount of open space to create other more neighborhood friendly activities.

In the study of TeMA - Journal of Land Use made by Abdelfattah L., Deponte D., and Fossa G., - *"The 15-minute city as a hybrid model for Milan"* authors mention examples of regenerative master plans that are experimenting with this hybrid model designing new 15-minute mixed-use neighborhoods.

[67] Abdelfattah L., Deponte D., and Fossa G., (2022), *The 15-minute city as a hybrid model for Milan*, TeMA - Journal of Land Use, Mobility and Environment, 71-86 Digital: https://doi.org/10.6093/1970-9870/8653

Milan railway yard regeneration

The project involves the redevelopment of Lambrate's railway yard through a 41,000 sqm public park with orchards, vegetable gardens, and 900 trees. The aim of the project is to transform the former rail yard into a vibrant urban community with a focus on people, community, integration and resilience. "The Milan railway regeneration project offers an example of a hybrid approach implemented in a strategic vision with urban-level implications and can support the aims of walkability and urban connectivity." [68]

Fig.34 Greco yard regeneration project: walkability of the public realm

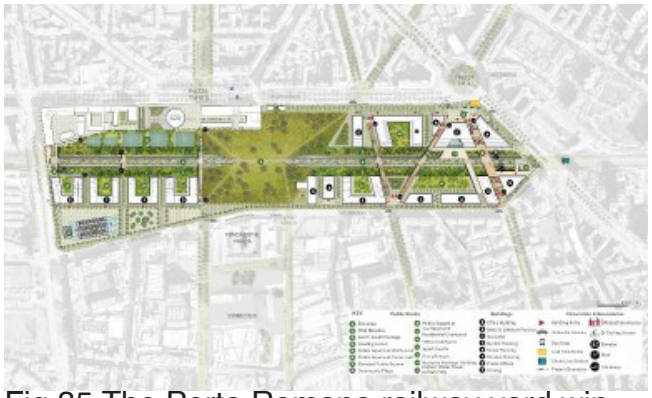

Fig.35 The Porta Romana railway yard winning project: the protagonism of the ground level experience

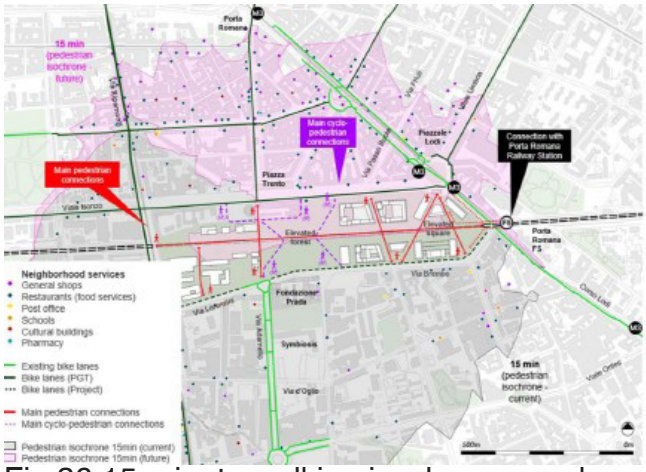

Fig.36 15-minute walking isochrones and accessible proximity services in the new Porta Romana plan

Fig.37 "Vitae" winning proposal render by the design firm CRA - Carlo Ratti Associati

Fig.38 "Vitae" winning proposal render by the design firm CRA - Carlo Ratti Associati

[68] Abdelfattah L., Deponte D., and Fossa G., (2022), *The 15-minute city as a hybrid model for Milan*, TeMA - Journal of Land Use, Mobility and Environment, 71-86 Digital: https://doi.org/10.6093/1970-9870/8653

Milan's Reinventing Cities Projects

"In the framework of decarbonization, which is a priority well integrated in the 15-minute model, Milan's interpretation of the Reinventing Cities program defines its inclusive guidelines within a hybrid touch."[28] "International design and innovation office CRA-Carlo Ratti Associati has won the "Reinventing Cities" competition organized by the C40 Cities Climate Leadership Group with a project for a new office building and center for scientific research in Milan, Italy." [70]

"Vitae is an innovative hybrid mix with the pedestrian path of Via Serio in view of walkable connections to the new Porta Romana district." [69]

"The "Vitae" project for a new office building and center for scientific research in Milan, Italy. The design by Carlo Ratti Associati features a 200-meter-long urban vineyard that covers the entire building, creating a publicly-accessible footpath that ascends from the street level to the rooftop.

VITAE has won the competition to reinvent a vacant, post-industrial lot in via Serio, a street in south Milan located a few hundred meters from the Fondazione Prada contemporary art museum. The complex includes a brand-new piazza, adding up to a total of more than 5000 square meters of public space given back to one of the city's most vibrant neighborhoods." [70]

Abandoned and dismissed areas in the city are the great opportunity for regeneration and redevelopment interventions. Post-industrial cities such as Milan, Turin or Lodz possess a great amount of vacant post-industrial sites located within city barriers and have great potential for regeneration and application of hybrid 15 minutes city models. After the pandemic the focus should be brought on the redevelopment of public spaces where the open spaces should coexist with mobility spaces and promote walkability of neighborhoods.

"As in case of urban development in Milan (Milan 2020 Adaptation Strategy) the project focus on peripheral neighborhoods beyond the railway ring through the action of creating social spaces in strategic squares 10 and pop-up bike lanes along the main penetration road axes from the city gateways (transit interchange nodes) to the central pedestrian areas, while ensuring connections to new regenerated sites.

Combining planning and urban design is necessary to promote hybrid mixes as hubs of the 15-minute neighborhoods and as starting points of a participatory, incremental process of a hybridization of open spaces and urban textures. In short, the 15-minute model requires mixed patterns across the board: in land use, social mix, and biodiversity." [69]

4.3.7 Adaptive reuse of post-industrial sites

Covid-19 pandemic highly influenced city life and urbanism. During the global lockdown and health emergency services offered to citizens proved to be inadequate in many European cities.

The lack of sufficient spaces and services brought back the idea of reuse of disused urban voids in order to serve other necessary amenities.

"Adaptive reuse reduces obsolescence in existing buildings whose current use is no longer in demand due to economic change and shifts in social behaviors or end-user expectations." [71]

"Temporary adaptive reuse is an economic renewal policy mechanism to address vacancy." [72]

"Temporary reuse connects with the UN Sustainable Development Goal 11: inclusive, safe, resilient and sustainable cities and human settlements." [73]

"Temporary-use is associated with entrepreneurial activity, often through community, creative arts or cultural groups, and 'pop-up' businesses that cannot commit to longer-term

[69] Abdelfattah L., Deponte D., and Fossa G., (2022), *The 15-minute city as a hybrid model for Milan*, TeMA - Journal of Land Use, Mobility and Environment, 71-86 Digital: https://doi.org/10.6093/1970-9870/8653

[70] https://carloratti.com/project/vitae-milan/

[71] Abramson D. M., (2016), *Obsolescence: An architectural history*, University of Chicago Press

[72] O'Callaghan C., Di Feliciantonio C., (2021), T*he New Urban Ruins: Vacancy, Urban Politics and International Experiments in the Post-Crisis City*, Policy Press

[73] United Nations, (2021), *Sustainable Development Goals, Goal 11: Make cities inclusive, safe, resilient and sustainable*

leases. Temporary-use is a desirable alternative to mothballing space until end-user demand for existing uses increases." [74]

n the research made by Francini M., Margiotta N., Palermo A., Viapiana M.F., (2020) "Per efficienti "infrastrutture sociali": il recupero di siti ed edifici dismessi - For efficient "social infrastructures": the recovery of abandoned sites and buildings, authors refer to the abandoned sites and their opportunity for redevelopment. They did research in which they proposed a methodology GIS-based for identification and evaluation of brownfield sites, that aimed at identifying the most suitable areas for settlement of new "social infrastructures". The research was conducted during the health crisis which highlighted shortcomings quantitative and qualitative of the services offered to citizens.

The evaluation was carried out with reference to the environmental quality of the sites, or on the basis of the risks present. "The study was performed on the Municipality of Vigevanone and confirmed validity as regards the process screening of the territory, and has allowed identify areas characterized by a plus high environmental comfort." [75]
"The advantages associated with re-functionalization of underused areas and structures were partly tested in the period more acute than the emergency, during which numerous temporary hospitals have been set up in these spaces." [75]

In the research there were point up examples where the existing structures were readapted according to the covid-19 emergency and the issue of reuse of abandoned sites was critically mentioned. Former brownfields or former industrial sites can be reused during the health emergencies in order to provide the sufficient services for the cities.
During Covid-19 pandemic there are several examples where sites and structures were readapted to new uses during the pandemic as the Covid hospital Fiera di Milano, built in the complex fair designed within an area previously occupied by a refinery, the field hospital CURA at the OGR of Turin, ex industrial complex that was redeveloped into artistic center and scientific and technological research hub, the temporary hospital in the ExCel London Center the conference center and exhibitions held in the London Docklands, complex of former port infrastructures renovated to be used as commercial and residential areas or covid-19 vaccine center in Lingotto in Turin the former Fiat factory.

Fiera di Milano - "Fiera" Hospital
During the health emergency, Covid-19 pandemic, Fondazione Fiera Milano gave availability of 1 and 2 pavilions of the Portello.
The project of the Covid19 Emergency Intensive Care "Fiera" Hospital, commissioned by the Lombardy Region, in collaboration with the IRCCS Ca 'Grande Ospedale Maggiore Policlinico Foundation, provided for the construction of approximately 205 beds. Inside the two pavilions, which cover over 25,000 square meters of surface area, special modules / containers were set up that were equipped with beds for the care of patients involved in the Covid-19 emergency.
It was a fully operational hospital and not just a hospitalization for coronavirus patients, but a structure capable of treating any other related pathology.
The hospital was set up within the first two levels of the exhibition hall. The planning of the works was divided into 3 phases of intervention, to allow the immediate availability of beds.

[74] British Council for Offices (BCO), (2017), *Mitigating Office Obsolescence – The Agile Future*
[75] Francini M., Margiotta N., Palermo A., Viapiana M.F., (2020) "Per efficienti "infrastrutture sociali": il recupero di siti ed edifici dismessi " in *Riabitare la città dopo l'emergenza, tra distanze e nuove forme di prossimità in Urbanistica informazioni XII Giornata Internazionale di Studio INU Benessere e/o salute? 90 anni di stud*i, politiche, Di Biagi Paola, Basso Sara, piani, INU, Roma, 2020, p.19-23

Phase 1 involved the construction of four modules, each consisting of two hospital units and a health service unit, real rooms for a total of 53 beds with dedicated services and support areas for on-site implementation of all diagnostic and therapeutic health activities. For the first four units, 186 doctors and nurses will be employed as well as 60 support figures. Phase 2 and Phase 3 were then implemented for the completion of the other operational units. [76]

Fig.39 Fiera di Milano - "Fiera" Hospital
Source: https://www.lombardianotizie.online/ospedali-fiera-milano-bergamo/

OGR - CURA

CURA - "Connected Units for Respiratory Ailments" and also "Cure" in Latin, proposes a quick-to-deploy solution to expand emergency facilities and ease the pressure on healthcare systems treating patients infected by coronavirus. The first CURA pod was installed on April 19th, 2020 at a new temporary hospital set up in Turin in the former OGR industrial complex. CURA was designed by Carlo Ratti Associati with Italo Rota engineers at Jacobs, and health technology company Philips for medical equipment supply.

CURA project was built by 6m intermodal containers units, repurposed with biocontainment equipment. By use of an extractor the indoor negative pressure was created in order to comply with the standards of Airborne Infection Isolation Rooms AIIRs. On each container unit , two glass windows were placed on the opposite sides in order to provide doctors a constant view for patients both inside and outside of the pods. This also allowed external visitors to get closer to their relatives in a safer and more humane setting. Each pod worked autonomously and could be promptly shipped to any location around the world, adapting to the needs of the local healthcare infrastructure. [77]

Fig.40 CURA hospital
Source: https://carloratti.com/project/cura/

[76] https://www.ospedalefieramilano.it/it/l-progetto.html
[77] https://carloratti.com/project/cura/

ExCeL London exhibition center - NHS Nightingale Hospital

The ExCeL London exhibition center was converted into an emergency COVID-19 hospital facility with 4,000 beds, delivering the first 500 in just nine days. The hospital was managed in the coordination with BDP who worked closely with clinicians, consultants, contractors CFES, the ExCeL facilities management team and the British Army, ensuring that every bed could be fitted with all the equipment required to treat seriously ill patients, cared for by dedicated staff in full PPE equipment. The bed heads and service corridors were constructed from a component system that is usually used to construct exhibition stands and there was some simple reinforcement to allow services to be fitted to the walls. Minimal building intervention enabled maximum use of the building's assets. Clinical flows determined the circulation strategy within the building. The wards are linked with a temporary tunnel across a boulevard which allows connection to the diagnostics area. The ExCeL center's existing electrical infrastructure was modified to increase the resilience, UPS and temporary generators. The temporary electrics used for exhibitions were used to feed a 3m section of bed head dado trunking prefabricated by electricians on site. The medical gas installation comprised two distribution ring mains run around the basement car park at high level, rising up to feed each bed head through the service floor boxes and then distributed to the bed head via the service corridor. [78]

Fig.41 ExCeL London exhibition center - NHS Nightingale Hospital
Source: https://www.bdp.com/en/latest/news/2020/excel-exhibition-centre-repurposed-into-nhs-nightingale-hospital/

Lingotto - Vaccinale Hub

The largest vaccination center in Turin. A new hub for anti Covid-19 vaccinations at the Lingotto was inaugurated 14 th of april 2021 inside the shopping center. Thanks to its 1200 square meters and 20 vaccination boxes it has a potential of 1500 doses per day of anti-Sars-CoV-2 vaccine. The vaccination hub is placed under the former 8 Gallery shopping center - Lingotto on the ground floor. The entrance is separated from that of the shops, placed via Matte Trucco, behind what was once the FIAT factory. [79]

Fig.42 Lingotto - Vaccinale Hub
Source: https://torino.corriere.it/cronaca/21_aprile_12/vaccini-nuovo-hub-lingotto-1500-dosi-giorno-2d0bf206-9b9b-11eb-a4a1-866c33c02647.shtml

[78] https://www.bdp.com/en/projects/m-o/nhs-nightingale-hospital/
[79] https://www.aslcittaditorino.it/trasferimento-hub-vaccinale-lingotto/

4.7 Reflections and possible changes in urban development

"The quest for more sustainable and smarter cities is urgent, as cities contribute more than 60% of greenhouse gas (GHG) emissions, and thus demands a redefinition of some contemporary urban policies, especially around mobility. The '15-Minute City' is an emerging concept, currently in application in major European Cities, such as Paris and Barcelona, and quickly gaining popularity as a potent solution for encouraging urban sustainability transitions." [80]

"In the countdown to The UN Climate Change Conference in Glasgow (COP26), two crucial reports, the Intergovernmental Panel on Climate Change 6th Assessment Report and the Nationally Determined Contributions synthesis report by the UN Framework Convention on Climate Change, have highlighted that global temperatures are poised to rise by 2,7°C by mid-century, substantially higher than the preferred 1,5°C more than preindustrial temperatures pledged in the Paris Agreement." [81]

"Estimating the aggregate global GHG emissions reduction of a 15-minute city planning model would be valuable, because vehicular transportation accounts for more than 78% of emissions in urban areas and up to 70–80% of NO2 emissions, and globally 14% of emissions are attributed to the transport sector." [82] It is difficult to completely reduce the vehicle mobility in the cities but it would be possible to to estimate the emissions reductions that can be achieved by urban restructuring, that applies chrono-urbanism concept (15 minutes city), and by associated activities of local consumption and production

"A reduction in the emissions of greenhouse gasses, improved air quality, and other benefits in cities could be further achieved through three additional dimensions (density, diversity, and digitalisation) that form the basic pillars of the 15-minute city. Beyond traditional population and services density quotas, increasing access to urban amenities can result in optimal consumption being achieved without constraining available resources. This planning model also envisions mixed-used built environments accommodating residential, commercial, and entertainment functions, and at the same time promoting multiculturalism. With this model, health, social interactions, and relationships can be fostered and promoted." [83]

The application of the 15 minutes city model will lead to the higher density of population and services and diversity that could result in shorter travel distances where motorized traffic is replaced with active travel, leading to lower CO2 and air pollution emissions and better air quality. The remaining public space could be used for green spaces, contributing to some extent to carbon sequestration and reducing urban heat island effects. Noise levels will be reduced too.

"Altogether, these factors will lead to better citizen health, with a reduction in health complications such as premature mortality and diseases of the cardiovascular and respiratory system, obesity, brain diseases (eg, Alzheimer's disease), and cancer." [84]

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[80] Allam Z., Bibri S.E., Chabaud D. ET AL.,(2022), "The '15-Minute City' concept can shape a net-zero urban future" in *Humanit Soc Sci Commun 9, 126*
Digital: https://doi.org/10.1057/s41599-022-01145-0

[81] Intergovernmental Panel on Climate Change. Climate change 2021, The physical science basis
Digital:https://www.ipcc.ch/report/ar6/wg1/ downloads/report/IPCC_AR6_WGI_Full_Report.pdf

[82] WIGGINS B., (2020), *Cars are a major source of greenhouse gas emissions — some cities are finally taking action*
https://www.globalcitizen. org/en/content/cities-car-bans-greenhouse-gas-emissions

[83] Allam Z., Nieuwenhuijsen M., Chabaud D., Moreno C., (2022), "The 15-minute city offers a new framework for sustainability, liveability, and health" in *The Lancet Planetary Health*, Elsevier

[84] Nieuwenhuijsen M J., (2020) *Urban and transport planning pathways to carbon neutral, liveable and healthy cities, a review of the current evidence*, Environ Int, 140: 105661

Sustainable mobility in cities is the most crucial point in terms of climate change and health. By replacing the long commuting and car journeys with bicycles would reduce vehicle emissions, increase residents' health, and free up roads and parking spaces for other uses.

The new neighborhoods should provide their residents the necessary services, which can be reached on foot or by bicycle within a few minutes. All neighborhoods should encourage active mobility, include housing of different types, provide affordable housing, build schools, hospitals, retail shops and ensure access to public spaces, green spaces or sports and recreational facilities.

The C40 Mayors Agenda for a Green and Just Recovery published on 15 July 2020 by C40 Cities, an international network of cities focused on fighting climate change and promoting sustainable development, also supports the idea of the 15-minute city.

"The agenda states that Cities are the "engines of recovery" by investing in their resilience is the best way to avoid economic disaster."[85] Proposal C40 suggests that following the 15-minutes city model would help global cities deliver on the document's promise of equal access to jobs and urban services for everybody, and rebuild areas economically affected by the pandemic.

[85] Pinto F., Akhavan M.,(2022) *Scenarios for a Post-Pandemic City: urban planning strategies and challenges of making "Milan 15-minutes city",* Transportation Research Procedia, Volume 60, ISSN 2352-1465, p: 370-377

5

POST-INDUSTRIAL CITIES, ŁÓDŹ AND TURIN AND THEIR STRATEGIC DEVELOPMENT PROGRAMS FOR FUTURE CHALLENGES

ŁÓDŹ

5.1.1 Adaptation Plan to the Climate Change of the city of Łódź by 2030

The plan of adaptation to climate change in the city of Łódź until 2030 is part of the project for 44 Polish cities for climate change "Wczujmy się w klimat" (Let's Feel the Climate).
The "Wczujmy się w klimat" project was carried out by 44 Polish cities in cooperation with the Ministry of the Environment. Its goal is to adapt cities to the observed and forecast climate changes. The intention of the Ministry of the Environment, underlying the launch of the project, was to educate and raise awareness in this regard at the local level - both among officials and municipal communities.
The plan of adaptation to climate change in the city of Łódź until 2030 was created in response to one of the most important problems of environmental protection, which are climate change and the need to adapt to the effects of these changes. The plan indicates the vision, main goal and specific goals of the city's adaptation to climate change that should be achieved through the implementation of selected adaptation measures in the four most sensitive sectors, areas of the city: public health /vulnerable groups, water management, transport and high-rise housing intensity.

The adaptation plan includes a diagnostic part in which climatic phenomena and their derivatives are described affecting the city, the city's sensitivity to these phenomena and coping capabilities were assessed with the effects of climate change.
Actions were defined in response to the risks identified in the diagnostic part of the document adaptation measures necessary to be implemented in order to increase the city's resilience to the existing ones and predicted future phenomena.

The plan includes three types of activities:
1. Information and education activities
2. Organizational activities
3. Technical activities

The Adaptation Plan also specifies the rules for the implementation of adaptation measures (entities responsible, funding framework, monitoring indicators, assumptions for evaluation and updating document).

Organizational activities concern changes in local law in the field of e.g. planning spatial organization, organization of public space, creating guidelines for dealing with situations the occurrence of climatic threats, improvement of the functioning of municipal services or systems warning against dangers.
Information and education activities are activities that support and raise public awareness of climate change and promote good adaptation practices. They help to immunize the city and its
residents through appropriate educational programs and intensified information activities.
Technical activities are activities of an investment nature including the construction of a new or modernization of the existing infrastructure, which helps to protect the city from the negative effects of climate change.

5.1.2 Development strategy for the city of Łódź 2030+

"The 2030+ Development Strategy for the City of Łódź is a multidimensional project that is the basis for further changes in the city. In its assumptions, it focuses primarily on pro-ecological development and building Łódź's resistance to various types of crises. Much attention in the document is devoted to the creation of a "green city", sustainable economy and infrastructure, including

transport, as well as the construction of mechanisms for in-depth participation and the development of human capital. An important element of the new development strategy for Łódź is the inclusion of residents in the creation of a friendly and open city, through their active participation in the process of designing changes. The foundation of the "Strategy for the development of the city of Łódź 2030+" is to be the close cooperation of the community, institutions and administration, and the moderator of this process is the City of Łódź Office."[1]

The challenges formulated before 2020 and the adopted general goals did not change to the fundamental outdated. However, the new development strategy should be included in the program and operational layer of new phenomena and trends that have occurred in the socio-economic and political environment of cities.
There has been a change in the directions of the EU cohesion policy and the priorities of Polish policy regional, intensification of official and unofficial migration processes, climate change, the scale of an aging society and the related challenges related to the sphere of services, public transport, housing, health, etc. The most unexpected change was the COVID-19 pandemic and its consequences.

Łódź - a living urban organism in which no energy source is wasted, in which administration, business, research community, residents and all interested parties, together they create its development.
The development strategy for the city of Łódź 2030+ defines the vision of Łódź, in the perspective of more than a decade, in three dimensions.

The most important conclusions from the development strategy for the city of Łódź 2030+ of the social, economic, environmental and spatial situation, the necessary points are:

1. Mitigation - taking measures to stop climate change and adaptation - adapting to new climatic conditions in such a way as to minimize the risk of their negative impact on the way society and the economy function.
2. Development of infrastructure increases competitiveness, investment attractiveness and living conditions in the city.
3. Counteracting the negative effects of demographic processes.
4. Development and support of human and social capital, as well as the growth of innovation.
5. Increasing the efficiency of city management (including financing of development activities) and cooperation between neighboring territorial self-governments and between sectors.

• Activities, not objects - Łódź is not a collection of buildings, systems or other objects, but a place of activity consisting in the efficient management of the idea process > evaluation > implementation > measurement of results
• An inclusive and engaging city - Łódź engages, draws in, motivates and provokes to activities by creating opportunities, mechanisms, tools and incentives for the implementation of initiatives individual and collective
• A city that connects and unites - the city does not exclude some while privileging the others, but invites everyone to contribute. Łódź creates opportunities and infrastructure for meetings, exchange of ideas, joint work, cultural involvement, etc.

The development strategy for the city of Łódź 2030+ also highlights the necessity to support

[1] Kmin M., (2022), Łódź z Pomysłem na Przyszłość, Urząd Miasta Łodzi
Digital:https://uml.lodz.pl/aktualnosci/artykul/lodz-z-pomyslem-na-przyszlosc-id46955/2022/1/20/

the historic center of Łódź as a spatial one and functional heart of Łódź as a matter of a pragmatic and life choice for the city.

“It is necessary to carry out the revitalization process involving “hard” activities, and including modernization and renovation of tenement houses and historic buildings, space arrangement public and “soft” activities - economic reactivation of the urban zone, stimulating private entities to intensified investment processes synergistically with public investments, improving the living conditions of residents, including implementation help in solving social problems and increasing the attractiveness of the whole city zone for all users of the City. In order to achieve a lasting effect of the revitalization process, changes should be made concerning the ownership structure, precise definition of the division into public space and private.” [2]

Considerations regarding possible scenarios of activities within the city center lead to the choice of an ideological direction of development aimed at raising the standard living in the city center by creating a system of common spaces for residents, consisting mainly of: squares, passages and green areas furnished and communication spaces.
The adopted idea of increasing the attractiveness of the urban zone results in the need to strengthen the system of common areas, but also providing the foundations of its economic functioning.
“Lodz space was differentiated into 3 main action zones (Fig. 42):

W1 - restriction / conservation zone - the area of preserving the historical spatial structure,
W2 - the zone of equilibrium / compromise - the area of the historical spatial structure,
W3 - renovation / creation zone - the area of transformation of the historical spatial structure.” [2] “The key activities to be implemented in the metropolitan zone are:
The use of land reserves of former industrial and other sites, unused historic buildings and empty building plots in urban zones and recognizing them as priority investment areas of the city.

Plots available and visible from the side of public spaces will have a positive impact on the quality of the cultural landscape of the city center, raising the standard of living
creating new, high-quality public spaces, including arranged greenery; within undeveloped intra-quarter plots landscaping public in the form of small parks and squares with an area of at least 0.1 ha.
Giving a new function to degraded, post-industrial and post-military ones and unused areas concentrated around the urban city zone (specified in the Study as areas of multifunctional development (WZ). These are the areas that constitute the base for the development of the city center and the spatial continuation of the downtown building typology, demanding structural, functional and image changes.” [3]

[2] Strategia rozwoju miasta Łodzi 2030+, p: 9, 52

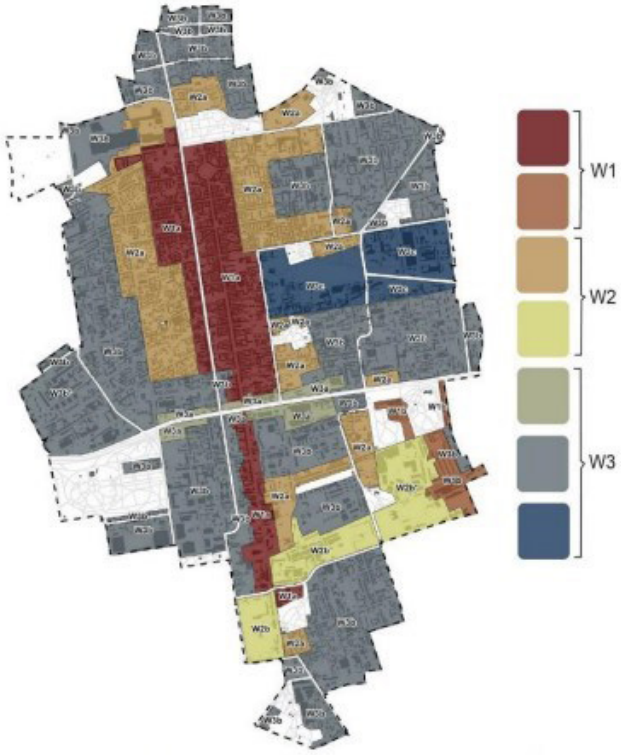

Fig. 43 Division of the metropolitan zones into the basic areas of activity
Source: MPU

5.1.3 Łódź with an Idea for the Future (Łódź z pomysłem na przyszłość) 2022 Report

In January 2022, the City Office of Łódź and the international consulting company Knight Frank released an extensive publication - Łódź with an Idea for the Future - which is an overview of programs and projects aimed at improving the quality of life in the city for residents and creating an ecosystem that will support business development.

Among the programs that were mentioned was Development strategy for the city of Łódź 2030+
with its four basic strategic goals determine the activity of Łódź in spatial, economic and social dimensions.
The report also summarizes all the directions of spatial development of Łódź in the document from 2018 “Study of conditions and directions of development of Lodz” and the city development model takes into account both the need to limit excessive urbanization and the need to revitalize the Łódź Metropolitan Area.
“Urban initiatives and the new city development strategy, are in line with the assumptions of sustainable urbanism, i.e. the direction in which modern European cities are shaped today. It is an approach to urban planning that improves the quality of life in the city by creating a better urban space. However, Łódź goes further and takes action in other areas of “city life”, such as culture, science, business, infrastructure, social development and ecology. Projects are undertaken by the city authorities, the academic community, local organizations, as well as developers and local communities, but the goal is common.
The list of ideas for Łódź and plans to be implemented in the coming years is long and it

[3] Strategia rozwoju miasta Łodzi 2030+, p: 52-53

touches many areas as mentioned in few examples below:

- Quality of life: a city on a human scale, a city that fits in with the idea of sustainable development and circular economy, a safe city, development of the city inward to improve the quality of public space.
- Urban greenery: a garden city, the organization of the World Horticultural EXPO 2029, a zero-emission city.
- Culture: Łódź is a leader in the audiovisual sector.
- Science and business: development of creative industries, increasing investment attractiveness, a center focusing on knowledge-based business.
- Transport and logistics: a strategic logistics hub of Central Europe, a city of smart and sustainable infrastructure." [4]

The report also emphasizes the revitalization projects that are planned for the former brownfields in Lodz. Since the city has post-industrial character in the architectural and urban dimension, Łódź has created a great opportunity to carry out significant revitalization of urban spaces and to bring post-industrial buildings back to life, which will become a friendly part of the urban fabric. In order to improve the revitalization processes in Łódź, the "Łódź Revitalization Program 2026+" was adopted – the first document of this type in Poland, based on a detailed diagnosis of the revitalization area, which shows the negative social, economic, spatial and functional phenomena occurring there. The next step was to determine the area of revitalization that can cover both part and all of the brownfield area. In Łódź, the degraded area coincides with the revitalization area, and its range was established by a resolution of the City Council in Łódź in 2016. As part of revitalization, social activities are also carried out, the effect of which is to prevent social exclusion of people living in revitalized areas. The activities undertaken include, among others, courses and training aimed at improving the competences and professional qualifications of the inhabitants of Łódź.

"The legal act regulating the revitalization process in Poland is the Revitalization Act of October 9, 2015, which makes it easier for municipalities to carry out revitalization activities as part of the Municipality Revitalization Programs (GPR) adopted by them and enables the use of special solutions such as the Special Revitalization Zone. This zone is established in the revitalization area by the City Council for a maximum period of 10 years, and its introduction facilitates the conduct of activities under (GPR) thanks to special legal regulations and special facilities." [5]

The Special Revitalization Zone was established in the entire revitalization area of Łódź in 2017 and allows the city, among other things, to organize an annual competition for subsidies for the renovation of buildings.

Among the projects that are undertaken in the revitalization process are revitalization of Księży Młyn (a group of textile factories and associated facilities) and the successively enlarged New Center of Łódź.

In addition to urban investments, numerous mixed-use developer projects are also appearing on the city map such as Fuzja project, WI-MA Widzewska Manufaktura or Textorial Park II (see chapter 6 - Future Mixed-Use Projects p.149-156)

[4] Kmin M., (2022), *Łódź z Pomysłem na Przyszłość*, Urząd Miasta Łodzi
Digital:https://uml.lodz.pl/aktualnosci/artykul/lodz-z-pomyslem-na-przyszlosc-id46955/2022/1/20/
[5] Knight Frank, (2022), *Łódź z Pomysłem na Przyszłość*, p.28
Digital:https://content.knightfrank.com/research/2379/documents/pl/lodz-z-pomyslem-na-przyszlosc-2022-8703.pdf?_c=24/01/2022%2009:32:07

TURIN

5.2.1 Climatic Resilience Plan 2020

One of the strategies of Climatic Resilience Plan 2020 for the city of Turin is the climate change mitigation that includes all actions aimed at reducing gas concentrations and a greenhouse effect in the atmosphere.
These actions include those that intend to operate “upstream”, or those aimed at reducing greenhouse gas emissions, and those that operate “downstream”, or on the sequestration of the leaked greenhouse gasses from a production process (through carbon capture and sequestration measures) or present in the atmosphere (through, for example, reforestation measures). Actions of the first type include those aimed at reducing the demand or production of energy, especially if it comes from non-renewable sources (oil, natural gas, coal) and those aimed at reducing the demand or production of goods, merchandise and services, especially if with high intensity of greenhouse gas emissions (e.g. beef, air transport). Mitigation policies aim to eliminate, or at least reduce, the causes of climate change.

The City of Turin has already launched its own policy to combat climate change for some years, by placing initially the emphasis on mitigation measures, such as energy saving and efficiency and energy production from renewable sources, to reduce local emissions of greenhouse gasses.
Turin was one of the first Italian cities to join the Covenant of Mayors because it is already strongly committed to the direction of sustainable development and because it is aware that only by setting common goals is it possible to achieve and exceed the EU climate and energy targets to improve the quality of life.
Specifically, Turin joined the Covenant of Mayors in 2009 and approved its Action Plan for Energy Sustainable (TAPE - Turin Action Plan for Energy) in September 2010, setting an ambitious target to reduce CO2 emissions : -30% by 2020 compared to 1991 emissions. TAPE, which represents the formal commitment of the City to significantly reduce its CO2 emissions , was periodically monitored in order to update the progress of the actions and verify that the trend of reduction of emissions was in line with the goal to be achieved by 2020.
The first TAPE monitoring report highlighted, by comparing the emissions inventory relating to the base year and to 2014, a reduction in CO2 emissions 22%. The second report monitoring has, on the other hand, made it possible to verify, by comparing the relevant emissions inventory to the base year and to 2017, the overcoming of the target that the City had set itself by 2020; in particular, a reduction in CO2 emissions was recorded 33%.

The completion of some actions already started and further new interventions will make it possible to achieve a reduction by 35% by the end of 2020. Although the reduced capacity for public investment has affected the difficulty of completing some of the actions provided for in the TAPE, in all monitored sectors there was a significant reduction in emissions on an annual basis.
The greatest reductions in CO2 emissions, compared to the year taken as a reference (1991), were detected in the municipal sector (-62%) and in the residential sector (-47%), while the transport sector (public and private) has recorded a reduction of 27% overall. In these sectors, the drop in emissions is attributable mainly to the extension of the district heating network, to the important replacement of lamps of public lighting with LED lamps and the energy efficiency interventions of the buildings created following the enactment of

specific laws and enormous, both nationally and regionally.

The preparation process of Climatic Resilience Plan 2020 made it possible to highlight and share with all the stakeholders involved, the previous commitment of Turin, which has long been active and attentive to the issue of environmental sustainability, the liveability of city spaces and the safety and well-being of those who live in the city. In particular, the comparison with the different Administration Structures made it possible to highlight the good practices and measures already existing in terms of adaptation to climate change, which will need to be continued over time by increasing its effectiveness to better prepare for the increasingly intense and frequent climatic events. Among these the measures aimed at reducing the vulnerability of fragile subjects during the hot period, as well as the drafting and dissemination of the forecast bulletin of heat waves, the implementation of hydraulic risk mitigation works along the main waterways, the clearing of some urban stretches of waterways. Among the actions identified to improve adaptive capacity at the local level, the City has started their implementation on the territory, focusing primarily on interventions that have multiple benefits.

5.2.2 Metropolitan Strategic Plan 2021-2023

The 2021-2023 Strategic Plan was the result of a broad participatory process, which involved in different moments and in different ways (public meetings, focus groups, working tables, interviews, questionnaires, sending written contributions) an extraordinary audience of local actors.
From the planning process, a Strategic Plan was born which, through the identification of 111 shared and integrated actions, aims to support the development and rebalancing of the metropolitan territory, helping to bridge the divergences between plains, hills and mountains and between metropolises, cities and small villages. The goal is to implement actions and interventions aimed at overcoming social margins, economic and territorial areas of the metropolitan area, through support for digitization, innovation and the competitiveness of the production system, with particular attention to micro and small enterprises, the support to the green revolution and ecological transition, upgrading of infrastructures for sustainable mobility, support for the education, training and research system, the enhancement of assets cultural and tourism opportunities, and the rethinking and strengthening of the local health system.

In order for these objectives to be achieved it was said that it is necessary that not only the planning process will be shared and participated but also the process of implementation of the actions that from it emerged from it are subsequently shared and supported by the territory and by all subjects, bodies and institutions who participated in the formulation of the Plan. It is necessary that everyone “takes responsibility” and contributes as much as possible to the achievement of shared objectives.

At the same time it is imperative that the local power system is able to rethink policies and methods of intervention, freeing themselves from a short-term political vision to look at the long-term growth and the well-being of future generations. Only in this way the economic crisis and social issues that we are going through could turn into an opportunity to relaunch, also through European funding provided by the Next Generation EU program, an

economic, social development and harmonious environment of the metropolitan territory.
With this objective, the Metropolitan City has opened a discussion with the Presidency of the Commission European underlining the importance of giving a greater role, recognition of skills and tools to urban and metropolitan areas for the implementation of the European Green Deal and the Next Program Generation EU.

5.2.3 Direct survey in Città Metropolitana di Torino and TRENTAMETRO project (Interview with Arch. Paola Boggio Merlo)

The metropolitan area of Turin has a series of large industrial voids, unused containers for which it is appropriate to identify a new role in future territorial development. A recent census of all abandoned areas of the Metropolitan City of Turin (TRENTAMETRO Project) highlighted how the metropolitan area is dotted with a large number of production areas disused which are located, in large part, in the first Turin belt and along the main routes, returning a design of the territory that reflects that of the main communication axes.
As for the assessment of production areas, an analysis was conducted for brownfield sites classification of the most attractive areas for investments and for possible reuse. The methodology used was based on criteria such as accessibility, production contexts and broadband, leading to the following results: out of a total of 133 brownfield sites, 72 were assessed as highly competitive, while the remaining a medium and low.
The location of the most attractive abandoned areas in the first Turin belt and along the main axes connection highlights where one of the zones are an opportunity for the City subway.
"The TRENTAMETRO project is promoted by the Città metropolitana di Torino in partnership with LINKS Foundation, Confindustria Piemonte and Consorzio per gli Insediamenti Produttivi del Canavese." [3]
The first step of the project was to identify all the abandoned industrial areas of the metropolitan territory measuring more than 5,000 square meters.
Then, after a selection of 130 mapped areas only 30 were considered as the most attractive and important ones which were located in close proximity to important services such as railway, airport etc.
"Within the project, a geo-referenced web platform* has been created and made available to the business world, which contains information about the localization of all the mapped abandoned areas, including those not included in the dossier. Moreover, the platform allows interaction with information about the territorial context in which the different areas are located." [6]
Now the project is handled by Regione in order to include it in the regional planning of the metropolitan area of Turin.
On the 25th of October 2022 together with my supervisor prof. Mario Artuso I attended the meeting in the Città metropolitana di Torino in Corso Inghilterra, 7 in Turin with Architect Paola Boggio Merlo were we discussed the matter of brownfield areas in metropolitan area of Turin and the issues connected to TRENTAMETRO project (see ANNEX p.218).
TRENTAMETRO project was launched in 2019 and among 30 available sites 5 were sold for private investors. One of the problems lying in the selling and redevelopment of these sites is the issue that there are no specific programs regarding the brownfield redevelopment. The problem also lay in the private to private relations of these areas and lack of specific aid from government and

[6] Città metropolitana di Torino, (2019), *Attraction Of Investments In The Metropolitan Area*
Digital: http://www.cittametropolitana.torino.it/cms/risorse/sviluppo-economico/dwd/attraz/dossier_30metro_en.pdf

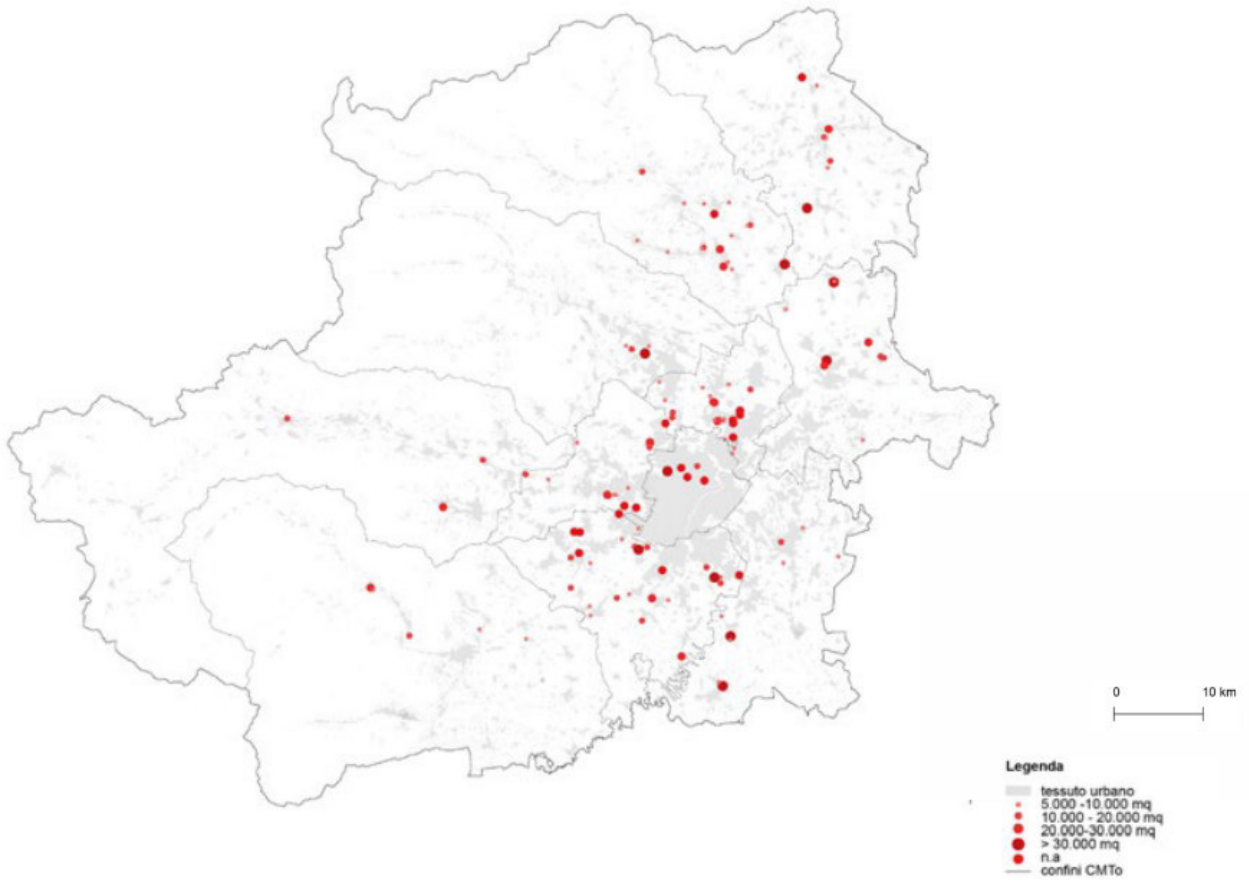

Fig. 2 - Localizzazione delle Aree dismesse (Elaborazione su dati CMTo - TRENTAMETRO).

Fig. 44 Localization of abandoned areas (Processing on CMTo TRENTAMETRO data)
Source: Piano Strategico Metropolitano 2021-2023 p.50

municipalities. All the sites that are presented in the TRENTAMETRO project belong to the private owners. Città metropolitana di Torino is not responsible for selling the abandoned areas but can imply the possible offers with compatible proposals. Another important issue that limits the redevelopment of brownfield sites occurred after Covid-19 pandemic where the foreign inventors changed their vision and they are not interested anymore in the investments around the metropolitan area of Turin.
During redevelopment of brownfields areas private owners must comply with the local planning and guidelines. In order to start the reclamation of the site the municipality must agree and accept the provided plans and include them in the planification.
Private owners that intend the redevelopment of the brownfields follow the rules of the provided master plan.

Among the five sites that were sold there is Area mf26 in area of Settimo Torinese, Industrial areas - Pi11, Pd, Area n.3 in area of Settimo Torinese, Ex Teksid in Carmagnola, CHIND Nord in Chivasso and Aree S.I.TO in Orbassano (see table in Annex p.227-229).

5.2.4 Direct survey in Città di Torino, new polices and challenges (Interview with Arch. Emanuela Canevaro)

On the 26th of October 2022 together with my supervisor prof. Mario Artuso I attended the meeting in the Città di Torino via Antonio Meucci, 4 in Turin with Architect Emanuela Canevaro (see ANNEX p.221).
During the meeting we discussed the issue of abandoned brownfield areas in Turin, their relationship with municipality and redevelopment projects.
In the city of Turin there are still post-industrial areas that remain abandoned as for example ex OSI-Ghia. As for sites OGM-Ex Officine Grandi Motori or Ex Nebiolo factory there are prepared the redevelopment plans by the municipality to be approved.
One of the biggest problems that limits the redevelopment of brownfield areas in the city of Turin is “Bonifica” , the cost of quenching and tempering the site. The urban restructuring does not have such high margins to cover and amortize reclamation costs of brownfield areas.
The other issue limiting the redevelopment of these sites is the dimensions and economic feasibility of private investors that influence the functions that can be placed in such areas. Moreover the most attractive functions for private investors lay in commercial use. For example the area Ex-Michelin the former industrial area in Turin, the area is the subject of a set of agreed executive plans connected with the masterplan that are being developed now. In the area of Ex-Michelin there are strong attractive and profitable functions which can be inserted in this specific place and not others. The area has desirable dimensions and brings necessary infrastructure that can sustain those functions. The reconstruction of Corso Romania will provide the passage of the highway which today is at the end of the dismissed railway line. There are many works that need to be carried out but the intended use is rich enough to generate the resources that allow the development of the area and the realization of the connected infrastructures.
In case of OGM project there is unfortunately again the commercial anchor because in the last 20 years the major part of the revitalization of these brownfields has supported that commercial destination. This issue brings behind the priority for other functions, residential structures and services.

When the redevelopment of brownfield sites is planned, private investors do not intervene without municipality, in Italy the masterplan is a juridical plan and municipality is always involved however due to private ownership of majority of sites have had already specified urban interventions and redevelopment plans that derive from PGR 1995 masterplan.
The PGR masterplan is very old, it was approved in 1995, it has undergone more than 300 variations and the studies were started in the 80s, 40 years ago. Some interventions regarding redevelopment of brownfields that were mentioned in the PGR were carried out and some not as in example of one of the “Spina‘’ projects - Spina 1 where the railway was dug out and redeveloped.
On the issue of the point of reuse, the PGR 1995 identified areas called urban zones of transformation ZUT that regard brownfields. For each one of them the master plan has made a mini urban project, some have been implemented and are still in the phase of closing, others unfortunately not.

Since the PGR masterplan from 1995 has been implemented almost 40 years ago, the municipality of Turin is working on the development of a new, more updated master plan

where one of the first activities is to review all the areas that from PGR 1995 were implemented, partially implemented and not fully implemented. In case of the areas that were not implemented, the municipality is preparing documents in which they try to understand why they have not been implemented, which were the problems that limited the redevelopment. Moreover the municipality is preparing a set of rules that will help to overcome all the issues that did not let the redevelopment of these areas. However the problem of private ownership still remains. There are some sites that have private-public relationships as Ferrovie dello Stato - where there are some sites that have not been subjected to the transformation but are the object of redevelopment plans for one of Spina projects mentioned in the masterplan. The relationship concerning the public-private ownership is now being managed during the development of a new master plan involving the private associations that are working with municipalities in order to identify which kind of services could be delivered in order to attract investors. Is the same logic that municipality did with the railway where the redevelopment was managed by real estate.

The high costs of redevelopment of brownfields as well as the lack of current masterplan, in order to support the management of brownfields, municipality is managing some of these sites on the base of the National Italian law 106 from the 12 of may 2011 translated into the regional law 16 of Regione Piemonte of 3 August 2011 - (LR 16/2011).
This law gives the possibility to request permits to build and act on abandoned areas and permits to change the functions and destinations in these areas that are different from those presented in the masterplan.

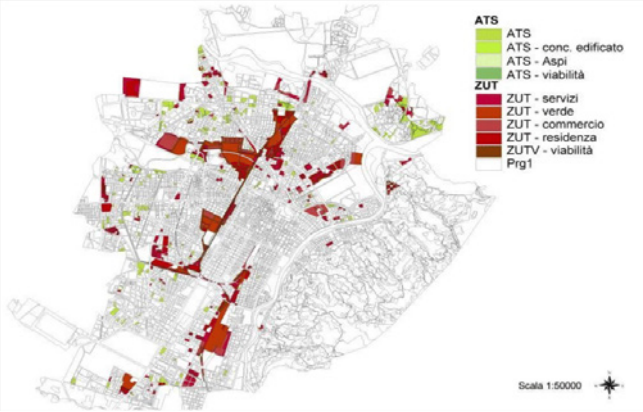

Fig.45 The regeneration of the city based on the abandoned industrial areas of which have become “Urban Transformation Zones (ZUT)” and “Areas for tertiary and services (ATS)”
Source: PRG Turin, 1995

This norm became attractive for private investors because they could choose the areas with the most interesting cost-benefit characteristics on the territory and insert functions that will increase the profitability and allow them to support operations. Many investors transformed these sites again towards the commerce sector which was not included in the masterplan. This phenomenon was not only considering areas from ZUT - urban zones of transformation but also simple punctual abandoned buildings. Moreover the new master plan will have to recognize and understand these changes.
Another issue that would help the redevelopment of brownfields is the national law of the consolidated construction law that was updated a few years ago by introducing a concept of temporary use - (L.120/2020).
Temporary use is based on use of a building or an abandoned area with functions other than those of the ones indicated in the regulatory plan but for a limited period of time 3 maximum 5 years. Municipality is using this

law to begin to certify in a non-definitive way any alternative uses of brownfields than those envisaged in the plan.
At the end of the 5 years of experimentation with new functions the site is studied and monitored and if the use did not go well, it did not contribute to enriching the territory and neighborhood, it is removed from the area and not considered in the master plan. On the other hand if this temporary use has been successful, it has brought light and life to that place it automatically allows to make the variant of the master plan and consolidate this intended use. This law is used by the municipality of Turin as a tool in order to test possible new services that were not mentioned in the master plan in sufficient and time relevant ways.
These initiatives were started by the municipality of Turin this June one of the examples was politecnico di Torino that had the need for more space for classrooms which use container structure and placed it in the area that was abandoned parking lot. Another case where the temporary use was implemented was placing the main office of Flashback association in Corso Lanza 75, in space that was rented from the cultural association. There is another case where in a small abandoned industrial site the artist changed the space into the storage area for his work and small office.

After Covid-19 pandemic another issue occurred where there was significant rise in demand for the marketing study sector of new logistic sites. Covid-19 pandemic increased online business for example: food and raised at the same time the need of sites to locate the logistical hub for these firms that are providing online commerce services. This issue could be addressed to redevelopment of brownfield areas that could provide the efficient amount of space for logistic sectors. The challenge was to attract logistical firms to locate their logistical hubs for the commerce facilities for example: Amazon hub. The municipality with the development of a new master plan is working on redevelopment of brownfield areas that were not managed in the past and the need for the logistic facilities could be one of the opportunities for such sites. The municipality is studying which sites could be suitable due to their position, proximity to include them into this type of site.
The municipality of Turin is working on a new master plan in order to address the main problem regarding the redevelopment of brownfield areas. One of the issues is to continue the redevelopment as it was indicated in the 1995 master plan but also to solve the problems that cause the delay in development in the last 20 years and identify present issues such as Covid-19 and consider their possible involvement into redevelopment of brownfield areas. The issue of providing the logistical hubs could be one of the main points that municipalities could incorporate into new plans for brownfield areas redevelopment.

6

ADAPTING CLIMATE CHANGE AND COVID-19 POLICIES IN REDEVELOPED INDUSTRIAL SITES IN ŁÓDŹ AND TURIN

Introduction

In this chapter the principle was to study the post-industrial sites and their response to two challenges of Climate Change and Covid-19. The specific post-industrial sites were analyzed in both cities of Lodz and Turin with two main objectives to identify if redeveloped brownfields areas are responsive to the future challenges of Climate change and global pandemic.

In the city of Lodz four project were chosen with already redeveloped post-industrial sites: Manufaktura (Izrael Kalmanowicz Poznański's factory), EC1 ŁÓDŹ (The first power plant in Łódź), Monopolis ("Monopol Wódczany" Spirits Industry Complex) and Ex factory of Franciszek Ramisch - OFF Piotrkowska Center.

Also three other redevelopment projects that are future projects in ongoing process of realization: Fuzja project - Power plant of the Karol Scheibler Cotton Products Society- Uniontex, Textorial Park II - Księży Młyn - Karol Scheibler and WI-MA Widzewska Manufaktura.

In Turin for already redeveloped post-industrial sites the analysis focused on: OGR, Ex Carpano - Lingotto, Etaly and Green Pea, Lavazza Headquarters and renovation of the former Enel power station, Parco Dora and Parco Aurelio and Docks Dora.

For the analysis of future and ongoing revitalization projects, Parco San Paolo - Ex Lancia and Ex Michelin - ToDream projects were chosen.

In order to identify if those sites are responsive to climate change and Covid-19 challenge the post-industrial sites were analyzed with the principle of Climate Change and Covid-19 aspects.

In the case of the Climate Change aspect many principles were taken into account in order to classify if the redeveloped post-industrial site is responsive to the challenge.

Among them were:

- Use of renewable energy resources in the project (solar panels etc.
- Water and waste reuse and recycling
- The participation in the reduction of emission of greenhouse gases
- The adequate amount of green spaces
- The use of sustainable materials with preferably low embodied carbon and with positive impact on environment

The adequate certifications were also taken into account, if the whole revitalized building was in the possession of sustainable building certificates that are recognizable globally such as British label BREEAM or American LEED or national certificate for Italy such as Protoccolo Itaca.

BREEAM - Building Research Establishment Environmental Assessment Method - is a third-party approved, world's leading science-based suite of validation and certification systems for a sustainable built environment. BREEM evaluates energy and water use, health and wellbeing, pollution, transport, materials, waste, ecology and management processes. Buildings are rated and certified on a scale of 'Pass', 'Good', 'Very Good', 'Excellent' and 'Outstanding'.

LEED - Leadership in Energy and Environmental Design is an energy and sustainability certification standard promoted by the U.S. Green Building Council that certifies the level of sustainability of a building: a set of criteria for the design, construction and management of buildings that are sustainable from an environmental, social, economic and health perspective.

There are 4 levels of certification - certified, silver, gold, platinum: the higher the number of points achieved, the higher the level of certification the building obtains.

In the case of identifying the principles that were adapted in the response of the Covid-19 aspects were more challenging. Most of the redeveloped sites underwent the revitalization process before the global pandemic of Covid-19. Most of the redevelopment of post-industrial sites did not focus on the 15-minute city and they were not prepared to overcome the challenge of global pandemic. In the case of the future, ongoing projects that are now in process of revitalization, the Covid-19 aspect was more evident.

In order to identify if the redeveloped post-industrial sites were responsive to the analysis in terms of Covid-19 two main aspects were distinguished.

The first one that was taken into account was the adaptive reuse of the spaces in already redeveloped post-industrial sites. During Covid-19 pandemic a lot of issues came to surface where among them was lack of adequate amount of health services, the lack of spaces or equipment in hospitals. Finally after Covid-19 vaccine was established it also raised the question how to provide vaccines to the majority of the population in the fastest way possible.

In that period many existing spaces were practicing the adaptive reuse of the buildings to provide temporary hospitals like in the case of OGR in Turin or to create vaccine centers that could cover a higher number of people like in the case of Lingotto Vaccine Hub in Turin.

The second criteria corresponding to Covid-19 aspect was focused on the idea of a 15-minutes city model. In some cases, for example the existing redeveloped projects that were carried out years ago it was more problematic to classify them as responsive to Covid-19 in this aspect.

The idea was to identify if there exist the main frameworks of 15 - minutes city model that was described by Carlo Moreno:

Density - Neighborhood that has renewable energy resources, residents can easily access all their needs without using the car and the spaces have multipurpose use

Proximity - residents of the neighborhood can easily access all the services they need within 15 minutes walk

Diversity - diversity in services, spaces and people in the neighborhood, mixed-use spaces

Digitalization - idea of Smart city principles for example: bike sharing, bike stations, online shopping, cashless transaction.

The below deep analysis and study represents the chosen post-industrial sites in both the cities of Turin and Lodz that were classified in order to understand if they possess the Covid-19 and Climate Change aspects.

ŁÓDŹ

6.1.1 Manufaktura (Izrael Kalmanowicz Poznański's factory)

Fig. 46 Manufaktura (Izrael Kalmanowicz Poznański's factory)
Source: www.lodz.travel

Transformation: shopping and entertainment center

Location: Drewnowska 58 street, Łódź
Brownfield type: Abandoned area
Project type: Renovation, New construction
Architecture Studio: Virgile&Stone, Sud Architectes
Date of project: 2002–2006
Surface: 270 000 m²
Stakeholder: -
Activities: shopping, service and entertainment
Pandemic aspect: Yes
Climate change aspect: Not specified

History

In 1850, Izrael Poznański started his own production of fabrics. Poznański's manufacture was dispersed, i.e. the looms were located in the houses of weavers. It had 50 weaving workshops and produced 100 thousand. running meters of fabrics per year. Poznański also had a license to trade in finished products of the Łódź industry and in the 1860s he was one of the most important Jewish merchants in Łódź.

From March 1871, Izrael Poznański started to purchase plots north of the road leading to the town cemetery. The first factory facility was a shethed weaving plant launched in 1872. 200 looms imported from England operated there. In 1875 it already had 640 looms and employed 294 people. When planning the expansion of the plant, Poznański invested in his own brickyard. In 1877, a four-story spinning mill with 36,000 spindles was built. On the premises of the factory, a bleacher, finishing, gas plant, dye-house and a textile printing house were also built. As a result of the expansion of the plant, Poznański had 2,266 mechanical looms, and the number of spindles was 80,876. It was then the second largest enterprise in Łódź, right after the Scheibler factory.

From 1877, Izrael Poznański planned to create a residential and industrial complex consisting of a factory, a working class district and a residential part (a palace and a garden).

In 1884, the building of repair shops was erected. In 1887, a textile dye-shop was built on the northern side of the Łódka River. In 1895 a large weaving building (high weaving mill) was built. Currently, it houses the MS2 Art Museum in Łódź.

Outcome of the refurbishment

The Manufaktura shopping and entertainment center has been operating since 2006 in the former Izrael Poznański's factory. It is a unique place not only in Poland but also in the world. The revitalization of the former factory combines history with modernity. When going shopping, you can admire the brick walls of the former factory, but also admire the glass facade of the shopping center. In the former walls of the factory, residents spend their free time, meeting their cultural, educational and entertainment needs. The former factory was rebuilt to preserve the atmosphere of 19th-century Łódź. Today, Manufaktura consists mainly of original, post-factory buildings, made of unplastered red brick. Parking lots for 3,500 cars were also built and 600 trees were planted. The total investment was approximately EUR 200 million.

Pandemic aspect:

Mixed-use of the complex
Main purposes of buildings:

The aforementioned new space of the Museum of Art in Łódź, MS2, is located in the building of a 19th-century weaving mill. It presents a collection of art from the 20th and 21st centuries.
The Factory Museum is located in the former printing house. It helps to imagine what life was like in nineteenth-century Łódź, or work in factories operating at that time. We will also learn about the life of Izrael Poznański.
The Mały Theater also operates at Manufaktura.
Right next to Manufaktura, in the beautiful palace of Izrael Poznański, there is the Museum of the City of Łódź.

When visiting Manufaktura, you can also go to the cinema, stay at a hotel, take advantage of the offer of numerous restaurants, bowling alleys, climb the climbing wall, zipline over the market square, use the beach in summer, play volleyball, dance or watch a concert, and go skiing in winter skating on a specially prepared ice rink.

6.1.2 EC1 ŁÓDŹ (The first power plant in Łódź)

Fig. 47 EC1 Łódź - The first power plant in Łódź
Source: www.lodz.travel

Transformation: National Center for movie culture, Heat and power plant

Location: Targowa 1/3 street, Łódź
Brownfield type: Abandoned building
Project type: Renovation, New construction
Architecture Studio: EC-1 East: - "Home of Houses" Sp. z o.o., arch. Rafał Mysiak EC-1 West, EC-1 South East: Biuro Realizacji Inwestycji FRONTON Sp. z o.o. and Mirosław Wiśniewski Architektura i Urbanistyka Sp. z o.o.
Date of project: 2010 - 2013
Surface: 28674 m^2
Stakeholder:
Activities: Cultural and artistic center, power plant
Pandemic aspect: Not specified
Climate change aspect: Yes

History

The construction of the power plant at Targowa Street began on May 26, 1906. The investor was the Society of Electrical Lighting from St. Petersburg, which, despite the ongoing revolution and the wave of strikes, completed its work in a record time of 18 months. The buildings were planned to house 4 turbine sets with a total capacity of 6 MW. Ultimately, there were as many as 7 of them with a total capacity of 21 MW. A reinforced concrete structure was used in the construction of the power plant.

On May 11, 1908, the first, only four, electric street lamps were installed in the New Town Square. Another 92 electric street lamps were installed in 1909 on the section of Piotrkowska Street - from today's Narutowicza Street to Jaracza Street. In 1913 and 1914, the streets of Łódź were lit by 163 electric street lamps, displacing gas lamps, mainly from Piotrkowska Street.

During World War I, the Germans robbed two of the newest turbine sets and 100 tons of copper cables from the power plant. After the First World War, the company's problem was ownership. The established Łódzkie Towarzystwo Akcyjne Sp. Akc. Undertook to hand over the power plant to the city free of charge after 40 years of operation, and at its expense was to install 1,500 street lamps.

In 1930, the so-called "New Headquarters (EC-1 West). The power of the power plant then reached 70.75 MW. When the ninth 30 MW turbine set was commissioned in 1939, the Łódź power plant was considered the most modern in the country. After World War II, EC-1 mainly produced technological steam for the Łódź industry. Its liquidation took place in 2005.

Outcome of the refurbishment

After the revitalization of the former power plant facility, which has been going on since 2006, the “EC1 Łódź - City of Culture” institution was established in the reconstructed and properly prepared facilities.

The walls of the former power plant include the Science and Technology Center, Planetarium, Center for Comics and Interactive Narration, the National Center for Film Culture and the Łódź Film Commission.

Climate Change aspect

The solutions adopted in the field of adaptation of individual buildings introduce a limited catalog of elements and innovative solutions, falling within the concept of “ecological construction”. They mainly concern the neutralization of threats related to significant environmental degradation, including the soil environment.

Targeted architectural ecological solutions

solar panels for heating water throughout the building, integrated into the facade of the building on the south side (EC-1 East);
LEED-certified windows (60% made of ingredients of natural origin);
ecological felt floor coverings with GUT certificate;
ecological paints (lead-free)
use of demolition bricks
wooden floors, the so-called industrial (made of small slats - waste)
division of the building into several heating zones (unused zone is not heated)
lighting the building with a minimum number of lighting fixtures allowing for its use
green roof (grass on the roof allows for partial evaporation of rainwater, and not draining it into the sewage system);
the green roof is also called a biologically active surface
fully glazed communication and recreation space (winter gardens) bringing building users closer to nature and the external environment (EC-1 East)
large glazing on the north side, and smaller on the south side, are important in the natural lighting of the building throughout the year, reducing the windows from the south results in savings when using air conditioning (EC-1 East)
rainwater - as an “educational” element used as part of the exhibition (water cycle) and for practical purposes, i.e. flushing toilets (EC-1 West)

6.1.3 Monopolis (“Monopol Wódczany” Spirits Industry Complex)

Fig. 48 Monopolis (“Monopol Wódczany” Spirits Industry Complex)
Source:https://new.abb.com/news/pl/detail/78890/abb-in-the-award-winning-monopolis-in-lodz

Transformation: multi-functional space with restaurants, a museum space, a theater and concert stage

Location: streets: ks. Tymienieckiego, Piotrkowska, Kilińskiego, Milionowa, Łódź
Brownfield type: Abandoned building
Project type: Renovation
Architecture Studio: Grupa 5 Architekci
Date of project: 2014-2020
Surface: 29 400 m²
Stakeholder: Virako
Activities: multi-functional space
Pandemic aspect: Yes
Climate change aspect: Yes

History

In 1896, the Russian Ministry of the Treasury bought a plot of land in the vicinity of the so-called “intersections of marshals”. Within four years, a complex of red brick factory buildings was built, in which the production of vodka began. In 1902, a bottling plant of Monopol Wódczany was established in Łódź. It was the third largest factory complex, after the factories of Karol Scheibler and Izrael Poznański. The building was designed by Franciszek Chełmiński, an architect known in Łódź. From 1927, alcohol and denatured alcohol were produced here as part of the State Vodka Factory No. 14. In the interwar period, the number of employees and bottling tables was systematically growing.

After the war, the plant resumed its activity, increasing production, and from 1963 it functioned as the Łódzkie Zakłady Przemysłu Spirytusowego POLMOS. During their glory days, they produced one million half-liter pure and flavored vodkas per year.

In the 1990s, the production dropped, in April 2007 the last bottle of vodka left the line, and on June 1, 2008, the plants closed their activities. In 2013, a new era of one of the most valuable monuments in Lodz began, the building was purchased by Virako, which began the revitalization of the building.

Outcome of the refurbishment

At the intersection of Piłsudskiego and Kopcińskiego streets, a modern post-industrial space was created, combining commercial, office, cultural and recreational functions.
The MONOPOLIS project implemented by VIRAKO was designed by Rafał Grzelewski and the Grupa 5 Architekci team. The name and

logo of Monopolis were developed by an outstanding Polish designer Janusz Kaniewski. A unique word-figurative mark emerged from his hand. Modern, but referring to history, with lettering inspired by the typeface of the 1920s, reflecting the spirit of the place. Today it is a multi-functional space with atmospheric streets, a series of restaurants creating a culinary arcade, a museum space, as well as a theater and concert stage.

Pandemic aspect:

The Monopolis complex in Łódź has won the prestigious award in the international MIPIM Awards 2020 competition. It has been recognized as the best mixed-use project in the world.
Monopolis, designed by the Grupa 5 Architekci studio, is one of the most technologically advanced revitalization projects in Poland. Two over a hundred-year-old buildings were "hung" almost in the air. By lowering the area by 4 meters, beautiful historic cellars were discovered, which today form a unique arcade with restaurants. The whole is complemented by great attention to architectural detail and omnipresent greenery. In the process of revitalization, the investor Virako attached great importance to preserving the character of the place (even the historic brick was cleaned in a way that guaranteed its natural appearance and patina). [1]

Climate Change aspect

BREEAM certificate at a very good and excellent level.
BREEAM - Building Research Establishment Environmental Assessment Method - is a third-party approved, world's leading science-based suite of validation and certification systems for a sustainable built environ ment. BREEM evaluates energy and water use, health and wellbeing, pollution, transport, materials, waste, ecology and management processes. Buildings are rated and certified on a scale of 'Pass', 'Good', 'Very Good', 'Excellent' and 'Outstanding'.

[1] https://www.bryla.pl/mipm-awards-2020-dla-monopolis-w-lodzi-to-najlepszy-projekt-mixed-use-na-swiecie

6.1.4 Ex factory of Franciszek Ramisch - OFF Piotrkowska Center

Fig. 49 Ex factory of Franciszek Ramisch - OFF Piotrkowska Center
Source: www.lodz.travel

Transformation: multi-functional space with restaurants, architecture and design studios

Location: Piotrkowska 138/140, Łódź
Brownfield type: Abandoned area
Project type: Renovation, new construction
Architecture Studio: OPG Orange property Group
Date of project: 2011 - ongoing
Surface: -
Stakeholder: -
Activities: The OFF concept includes activities from the borderline of culture, art, ecology, sustainable development and business
Pandemic aspect: Yes
Climate change aspect: Not specified

History

Franciszek Ramisch's spinning and weaving mill was built gradually from 1889. From 1879, Ramisch ran a manual cotton weaving mill and employed 8 workers who produced about 10,000. handkerchiefs. In 1889, the factory already had a steam engine and 64 mechanical looms, and it employed 70 workers. In 1897, it employed 227 workers, and in 1905 - 452. World War I brought the destruction of machines, mainly looms. In 1924, a joint-stock company was established - Fabryka Wyrobów Bawniczych "Franciszek Ramisch", which employed about 1,000 employees. Employment in 1935 was cut by half. The further development of the company was interrupted by the outbreak of World War II. After the nationalization, it housed the Łódź Cotton Industry Spinning House, and later General Walter. Since 1999, factory buildings have been used by various companies. At the end of 2011, OPG Property Professionals, the owner of the area at Piotrkowska 138/140, launched the OFF Piotrkowska Center project.

Outcome of the refurbishment

The complex houses architects, fashion designers and design studios, as well as music clubs, restaurants, exhibition spaces, rehearsal rooms, showrooms, concept stores and café clubs. Mass events are also held at Off Piotrkowska.
Future plans:
The neighborhood will change thanks to the renovation of buildings, public spaces and activities aimed at improving the quality of life of the inhabitants. Current and future residents of the area will have the opportunity to participate in neighborly initiatives and integrating events.

Six properties will be renovated in the vicinity, including the buildings of the former weaving mill of Ludwik Schmieder and Son (Wigencja), which will become an attractive cultural space with the new seat of the Pinocchio Theater.

In the renovated tenement houses, 26 municipal 1-, 2- and 3-room apartments will be delivered to the residents. There will also be 3 sheltered flats: for people leaving foster care, for people with mental disorders and for people with physical disabilities. In the backyard of the tenement house at ul. Sienkiewicza 56, there will be a public recreation space with a playground, an open gym and a municipal orchard. Specially designated green areas will also be found on the renovated sidewalks of ul. Sienkiewicz. The benches will be placed for a moment of rest, and cyclists will have new stands where they can leave their bicycles. Renovated streets and buildings will be adapted to the needs of people with disabilities.

After the renovation is completed, residents will be able to use a number of new or renovated institutions:
Pinocchio Theater
Center of Contemporary Art for Children and Youth
Library point with a bookstore
Daily Residence for Seniors
Daily Residence for People with Disabilities

In addition, there will be premises where it will be possible to conduct business:
service - 14 premises
artistic - 10 venues

Pandemic aspect:

Off Piotrkowska is an alternative mixed-use development situated in the former Ramisch factory at 138–140 Piotrkowska Street in Łódź.

[1] https://www.bryla.pl/mipm-awards-2020-dla-monopolis-w-lodzi-to-najlepszy-projekt-mixed-use-na-swiecie

FUTURE MIXED-USE PROJECTS

6.1.5 FUZJA PROJECT - POWER PLANT OF THE KAROL SCHEIBLER COTTON PRODUCTS SOCIETY - UNIONTEX

Fig. 50 Fuzja project
Source: https://fuzja-echo.pl/en/project/

Transformation: residential, office, commercial and service complex

Location: streets: ks. Tymienieckiego, Piotrkowska, Kilińskiego, Milionowa
Brownfield type: Abandoned land
Project type: Renovation, New construction
Architecture Studio: Echo investment
Date of project: Ongoing - 2019 - 2022
2019 April - 2020 December (construction of two residential buildings with 274 flats, restoration of the power plant, construction of a public square in front of the power plant and access to Tymienieckiego Street)
2022 (construction of two office buildings)
Surface: Usable area: 90,000 m2, Office space: 40,000 m2, Retail and service area: 15,000 m2
Stakeholder: -
Activities: residential, office, commercial and service complex
Pandemic aspect: Yes - 15 minutes city concept
Climate change aspect: Yes

History

The past of the historic heat and power plant dates back to 1907, when the first commercial heat and power plant was put into operation in Łódź to provide electricity for the city and factories. Karol Scheibler junior, whose father had developed in Łódź the biggest industrial empire in Europe, decided to make his own factories independent from external energy supplies. Thus, in 1910, according to the design of Alfred Frisch, the power plant of K.W. Scheibler Cotton Products Association was built.

The building consists of two parts (engine and boiler rooms) as well as a small tower adjacent to them from the north. The building's structure is in reinforced concrete – it is one of the first buildings in Łódź built in this way. At the same time, it is the widest reinforced concrete ceiling built without any supports. The elevation of the power plant is made with smooth lines, finished with contrasting materials – light-coloured plaster and red clinker bricks as well as large surfaces of mullioned windows finished with soft arches. The building is one of the best examples of Industrial Art Nouveau in Poland.

The consistency of styles can be seen also inside. The staircase was covered with indigo-coloured tiles (Prussian blue) and decors with white Art Nouveau plant motifs, the stairs are complemented by a winding, wrought balustrade. In the years of the power plant's glory, they were covered with a red carpet mounted with brass rods. The walls of the main hall are decorated with Art Nouveau Indian yellow tiles and the floor is covered with monochromatic tiles with a volute motif. Above them there are soaring windows with geometric stained glass windows.

Future outcome of the refurbishment

The merger will consist of 20 buildings with various functions, 14 of which are adapted post-factory buildings. The heart of this area will be the historic building of the former heat and power plant. Historical tissue will be supplemented with modern architecture, as well as urban infrastructure such as squares, alleys, pavements, streets and green areas. The investor has planned numerous amenities, incl. parking spaces for car sharing, bicycle paths, bicycle service stations, parcel lockers and generally accessible electric chargers.

Pandemic aspect:

15 minutes neighborhood concept:

“We make sure that the offer of Fuzja is as diverse and original as possible, but it responds primarily to the needs of people who will use this complex on a daily basis. We set up a few concepts. We certainly want tenants to include shops with daily necessities, a delicatessen with selected products and a bazaar with the offer of local food producers, manufactories or niche brands. We also plan to include wine and cheese shops among tenants from the retail sector. The offer will be complemented by numerous service points, such as laundry, beauty salon and hairdresser, as well as a rich gastronomic offer, medical and fitness center. We are analyzing various possibilities of developing the interior of the power plant. It is a special facility, built with a panache unusual for industrial facilities. The power plant, with its characteristic chimney, will be the central place and heart of the entire project. And in front of it there will be a public square with greenery and places to relax, as well as an area for organizing entertainment and cultural events. We want it to be an open and generally accessible place, and at the same time referring to the concept of a 15-minute neighborhood, it would meet most basic needs almost at your fingertips.” [2]

Climate Change aspect

ECHO INVESTMENT

Echo investment is the largest Polish developer with extensive experience in the main sectors of the real estate market: residential, retail and service, office and hotel. As a company co-responsible for the development of cities, they engage in projects that fit into the urban fabric and complement it. Their flagship project is Browary Warszawskie, which is being built in the heart of the fastest growing district of Warsaw. They run and prepare new city-forming projects in Warsaw, Kraków, Łódź and Wrocław. Each of them is a wisely and responsibly designed part of the city.
They have been listed on the Warsaw Stock Exchange since 1996. From 2019, our main shareholder is Lisala Sp. z o.o., owned by the Hungarian Wing IHC Zrt and Griffin Real Estate.

[2] OLBRYK WALDEMA - head of residential business and board member of Echo Investment S.A.

“Echo Investment principles towards climate change:
- Use energy efficiently and reduce the gas emissions that are responsible for climate change in the world. If reduction is not possible, offsetting the pollutant emissions generated by the use of available pollutants ways
- Reduction of the demand and re-use of as much as possible materials. Where it is not possible the advantage of these opportunities is taken, provision of safe treatment or disposal of waste.
- Segregation of materials and use only those that are friendly to people and the environment.
- Limit the negative impact of our activities on flora, fauna and their ecosystems.
- Working with designers, municipal green management and specialist companies, neighbors and the local community to protect trees.
- Reduction of the need for water, save it and use it again.
- Limit the amount of pollutants emitted into the atmosphere by the projects, road vehicles, mobile and stationary equipment and processes.
- Conduct of staff training and development in accordance with the principles of ecology.
- Reducing energy consumption in buildings
Protect trees” [3]

[3] ECHO INVESTMENT, (2020), *Raport zrównoważonego rozwoju Echo Investment 2020*, Kielce, p. 69

6.1.6 TEXTORIAL PARK II - KSIĘŻY MŁYN - KAROL SCHEIBLER COMPLEX

Fig.51 Textorial Park II
Source: https://textorialpark.com/en/enjoy

Transformation: Office center

Location: Tymienieckiego Street
Brownfield type: Abandoned buildings
Project type: Renovation, New construction
Architecture Studio: HORIZONE Studio
Date of project: 2019-2021 (Ongoing)
Surface: 38 900 m2
Stakeholder: St. Paul's Developments
Activities: Offices, services and gastronomy, green space
Pandemic aspect: Yes
Climate change aspect: Yes
BREEAM - Good
Building class: A

Future outcome of the refurbishment

Textorial Park II is a continuation of the success of the 2008 Textorial Park office complex. The project assumes 26,000 m2 of space for rent and 2,000 jobs. The project is developed by architects from the Horizone studio. The architects try to allude to the industrial history of the place. St. Paul's Developments Polska that is a stakeholder of the Textorial Park II development and is one of the investments restoring Księży Młyn to the inhabitants of Łódź. iIn Textorial Park II many modern offices will be built and a lively, fashionable and attractive public space. 9,000 m2 will feature green islands surrounding the buildings. The square will be filled with seasonal attractions, city festivals, gardens, deckchairs and swings, and a playground for children. It will be a natural meeting place and slow life - exhibitions, concerts, fashion shows - this place will also be teeming with life at night.

Pandemic aspect:

"A city within a city
An important element of Textorial Park II are also public spaces, which will occupy a total of 9 thousand. sq m. The investment includes the construction of many "green islands" surrounding the buildings. There will be benches and bicycle stands next to them. There will also be a bicycle repair point. The investor implements the project based on "placemaking". It is an increasingly popular trend consisting in creating a kind of "cities within a city", i.e. multi-functional spaces open to different residents and needs. Thus, it is the opposite of investments known from recent years, which were limited only to building - for example - one office building.

St. Paul's Development hopes that Textorial Park II will become such a modern space. The investor intends it to be "a natural meeting place, good cuisine and slow life". For this purpose, there are seasonal attractions, gardens, seating areas, deckchairs and swings.
Importantly, the property area will not be fenced in any way, and the courtyard will be accessible by one of several clearances. They are also planned in the office building. - We wanted to create an open area that would allow residents to use shortcuts. Thanks to this, they will be able to move freely in different directions, for example from Księży Młyn to Park Źródliska or from ul. Tymienieckiego to Fabryczna - adds Strzeński. - All this to make it the most friendly space not only for office workers, but also for residents." [4]

Climate change aspect

Project principles:

- Car sharing stations
- Bus and tram stops nearby
- Bicycle paths
- Use wood from forests with proper environmental management of forests
- Reduction of the use of unrecycled materials
- Use of the regional materials

"Balance and ecology

Despite the growing requirements for real estate and the way it is managed, Textorial Park still meets the high standards in terms of ecology and sustainable development, as evidenced by the renovation in June this yearBREEAM In-Use certificate at a good and very good level for the three office buildings of the complex.

As the investor emphasizes, this is another certification of the facilities - previously, Textorial Park received the certificate in 2011 as the first project in Poland, in which both new buildings and the revitalized part of the historic post-factory buildings were assessed." [5]

[4] BUJALSKI SZYMON, (2018) Oto Textorial Park II. Poznajcie wielką inwestycję na Księżym Młynie
From: https://lodz.wyborcza.pl/lodz/7,35136,23224904,oto-textorial-park-ii-poznajcie-wielka-inwestycje-na-ksiezym.html
[5] BANAŚ ANNA, (2021) *Textorial Park: Budynki z historią to miejsca przyszłości*, 09 gru 2021
From: https://www.propertynews.pl/biura/textorial-park-budynki-z-historia-to-miejsca-przyszlosci,97199.html

6.1.7 WI-MA WIDZEWSKA MANUFAKTURA

Fig.52 WIMA Widzewska Manufaktura
Source: https://cavatina.pl/cavatina_projects/widzewska-manufaktura/?lang=en

Transformation: The multifunctional project: offices, flats for rent, commercial and service premises

Location: al. Piłsudskiego 135 , Łódź
Brownfield type: Abandoned buildings
Project type: Renovation, New construction
Architecture Studio: Cavatina Holding
Date of project: 2020-2023 (Ongoing)
Surface: 52,340 m2
Stakeholder: Cavatina Holding
Activities: offices, flats for rent, commercial and service premises
Pandemic aspect: Yes
Climate change aspect: Yes
BREEAM - Good
Building class: A

History

The company known as Widzewska Manufaktura was founded by Juliusz Kunitzer, who persuaded Juliusz Heinzl to cooperate, creating a department store in 1880, and in 1889 the "Heinzel and Kunitzer Cotton Products Joint Stock Society". Later, the owners changed several times, and the most famous was the Konów family, disliked by the inhabitants of Łódź. " Over the years, the company has acquired several dozen properties throughout Łódź, not only in Widzew. During World War II, the Germans introduced large-scale production of artificial fibers in the stolen factories." [6] "In 1972, the plant was the first in the country to start producing yarn from staple polyester fibers. The second half of the 1980s was dominated by raw material problems, both in terms of cotton and artificial fibers. There were not enough funds to modernize the machines. A plan to modernize the plant was developed, planned until 2000, which was, however, unrealistic due to the lack of sufficient funds." [7] "In 1991, the official name of "Wi-Ma" was restored, and a year later its organizational form was changed to a sole-shareholder company of the State Treasury. Back in 1998, Wi-Ma employed over 1,100 people. At that time, however, spinning mills all over Europe were disappearing, so this company also did not manage to stay afloat." [8] In the following years, it underwent a series of problems, which ended in 2012 with deletion from the register of enterprises. Currently, the former buildings are the seat of "Zakłady Przemysłów Twórczych WI-MA in Łódź", where start-ups and young companies related to the so-called creative industries.

[6] ARCHIWUM PAŃSTWOWE W ŁODZI, Komitet Zakładowy Polskiej Zjednoczonej Partii Robotniczej w Widzewskich Zakładach Przemysłu Bawełnianego im. 1 Maja w Łodzi
[7] „Dziennik Łódzki" 1952–1989
[8] CENTRALNE MUZEUM WŁÓKIENNICTWA W ŁODZI, reference materials of the Historical Department, teczka „WZPB im. 1 Maja"

Future outcome of the refurbishment:

A mixed-use project is proposed for the area. “The concept of WIMA Widzewska Manufaktura was to create a modern, technologically advanced space for work, living and recreation with full respect for the historical heritage of this place. Therefore, the architectural design will preserve the elements of the former factory buildings, in particular the brick walls of the external walls and the original cast iron pillars in the planned office spaces and in the park. The aesthetics of the body of the office building in the part of the extension comes from the inspiration of the spinning thread system, which is not only an impressive visual treatment, but also a nod to the history and original function of this building.” [9]

Pandemic aspect:

A mixed-use project is proposed for the area, offering offices, apartments for rent, commercial and service premises as well as open spaces for rest and recreation, including a gastronomic and cultural zone. The revitalized 100-year-old park with a fountain will be a common meeting point for all users and guests, as well as the green heart of the investment. Modern A-class offices will find their place in the former “American” spinning mill (where cotton from the USA was processed), while the twisting and changing rooms will be adapted for housing purposes.

Climate change aspect

The project for new WIMA Widzewska Manufaktura will be conducted by Cavatina company which is known for its designs for offices andl city-forming mixed-use projects. All the buildings created by Cavatina since its inception are distinguished by the ecological BREEAM certification at the level initially Very Good and now Excellent. BREEAM is a sustainability assessment method and rating system for the built environment, its a scheme for any type of building; new or existing, anywhere in the world.

“ BREEAM schemes seek to minimize energy use and carbon emissions, for example through passive design, the use of low carbon technologies and the procurement of energy efficient equipment. The use of refrigerants, emission of nitrous oxides and transport associated emissions are also addressed through various BREEAM criteria. “ [10]

Through the consideration of issues such as GHG emission reduction, climatic modeling, flood risk management, air and water quality, and designing for resilience, BREEAM project teams are being challenged and upskilled to deliver and adapt a built environment fit for the climates of the future.

[9] https://cavatina.pl/cavatina_projects/widzewska-manufaktura/?lang=en

[10] WILLIAMS SARAH, CLEAR CHARLENE, *Mitigation, adaption, resilience: managing climate change risk through BREEAM* From: https://tools.breeam.com/filelibrary/Briefing%20Papers/98689-BREEAM-Resilience-Briefing-Note-v6.pdf

TURIN

6.2.1 OGR

Fig.53 OGR
Source: https://building.it/ogr-il-progetto-architettonico/

Transformation: Cultural and multi - functional space

Location: Corso Castelfidardo 22, Turin
Brownfield type: Abandoned building
Project type: Renovation
Architecture Studio: FOR Engineering Architecture
Bp + p Architecture & Design
Date of project: 2013 - 2017
Surface: 35 000 m^2
Stakeholder: Fondazione CRT
Activities: Museum, exhibition spaces, Research and technology centre, Office spaces, co-working spaces, Catering spaces, relax areas
Pandemic aspect: Yes
Climate change aspect: Not specified

History

For over hundred years the OGR - Officine Grandi Riparazioni, the late XIX century industrial complex, propelled the town's growth. In the 1990s the disrepair and abandonment led the site to the final closure and planned demolition. In 2013 Fondazione CRT bought the 20,000 sq.m H-shaped building, the offices and yards. The redevelopment of abandoned industrial heritage began through Societa OGR-CRT. The former train repairs workshops were transformed into new workshops for contemporary culture, innovation and business acceleration, with a marked international stance.

Outcome of the refurbishment

A 200-meter boulevard defines the wide central nave of the OGR Tech , naturally lit by the large windows of the roof at a height of 16 meters: on the sides of this spectacular perspective telescope - a veritable agora for the meeting between people and the exchange of ideas - two bays open characterized by crystal environments for meeting rooms and open space offices on two floors, modular and flexible, with 500 "smart" workstations , 'social' tables, "chat sofa" and "phone booths" areas soundproofed, ergonomic desks with adjustable heights and storable in Google headquarters style for maximum comfort at work. And again: 50 led wall and video wall screens for real-time transmission of news from channels such as Bloomberg or CNBC, as well as content and direct streaming of global events such as TechCrunch Disrupt SF or Web Summit.

In this space of 12,000 square meters inside the Officine Grandi Riparazioni in Turin, where the nineteenth-century industrial architecture

in brick with trusses and iron pillars has been entirely redeveloped by the CRT Foundation in an innovative way, to provide it with the best standards of environmental sustainability and technological security - including a Tier III certified data processing center , one of the highest in Europe - was inaugurated on 25 June 2019, an innovation hub dedicated to Tech among the largest in the country , with unique research projects.

Pandemic aspect:

The Crisis Unit of the Piedmont Region, together with other entities and the CRT Foundation, started on the morning of March 28, 2020 the inspections for the installation of a temporary hospital in the structure to deal with the COVID-19 pandemic. The construction work on the site, which began on 4 April 2020, involved an area of approximately 8,900 m²; a module with 92 seats was created, divided into 4 stabilization posts in intensive emergency, 32 sub-intensive care posts and 56 ordinary hospitalization posts. The inauguration took place on April 18, 2020.

6.2.2 Ex Carpano - Lingotto, Etaly and Green Pea

Fig.54 Lingotto

Fig.55 Green Pea and Etaly

Transformation: Commercial center

Location: via Ermanno Fenoglietti,via Nizza, Turin
Brownfield type: Abandoned site and building complex
Project type: Renovation, new construction
Architecture Studio: Renzo Piano - Lingotto
Studio Blu Architetti Associati
Date of project: 1982-2002 Lingotto
2004 - Etaly
Surface: 246,00 m2 Lingotto
Stakeholder: -
Activities: Commercial, office, hotel, entertainment
Pandemic aspect: Yes
Climate change aspect: Yes

History

Lingotto
The FIAT factory in Lingotto was built in 1915 by architect Giacomo MAtte Trucco. It was the first example of industrial architecture made in reinforced concrete.
After the production activity ended in 1982, the future of the FIAT factory depended on its adaptability to a new function. The massive building was then renovated in the 1990s by Renzo Piano who converted it into a multifunctional facility with exhibition spaces, conference center, hotels, shops, offices and training spaces.

Ex-Carpano and Etaly
During the renovations of the Lingotto factory by Renzo Piano the entire surrounding area underwent significant changes as for example on the north part of the car plant the historical factory of Turin's vermouth, Carpano.
The demolition of some buildings in the Lingotto, to carry out the project by Renzo Piano, left the blind dividing wall between Lingotto and Carpano as a 'facade'. The redevelopment plans of the Carpano complex have also been implemented.At the beginning of the 21st century, the Studio Blu Architetti Associati began to explore the possibility of transforming the historic complex into a sort of pole of taste . Then, in 2003, the Municipality of Turin has started the transformation of the area into a food and wine theme park ; in addition to the creation of the new street, between the Lingotto and the Carpano, the new Detailed Plan of the Lingotto also provided for the construction of a large public pedestrian square . In 2004 , the creation of the Enogastronomic Park, intended for cultural activities, for the sale and tasting of food products, was assigned to Eataly , through a public tender.
Inside the former Carpano , today there is

space for Eataly, with its educational and consumer activities and its office and also the Carpano Museum , a conference room and a guesthouse.

Green Pea
15,000 m² of sustainable products that respect the Earth, air, water and people. Green Pea is the first Green Retail Park in the world dedicated to the theme of Respect and opens at the Lingotto , next to the first Eataly opened in 2007.
Green Pea is a highly sustainable building, a manifesto built with new technologies and natural materials to convey, through architecture, the idea of respect for the environment and harmony with nature. Commissioned by Eataly Real Estate, Green Pea is the last step in the redevelopment of the former industrial area Carpano Lingotto, a pivotal project in the regeneration process that affects the southern area of Turin.

Pandemic aspect:

The Lingotto Vaccinale Hub
The largest vaccination center in Turin. A new hub for anti Covid-19 vaccinations at the Lingotto was inaugurated 14 th of april 2021 inside the shopping center.
Thanks to its 1200 square meters and 20 vaccination boxes it has a potential of 1500 doses per day of anti-Sars-CoV-2 vaccine. The vaccination hub is placed under the former 8Gallery shopping center - Lingotto on the ground floor. The entrance is separated from that of the shops, placed via Matte Trucco, behind what was once the FIAT factory.

Climate change aspects

Green Pea Green points:
Technology meets Ecology. At Esemplare we believe that an authentic balance between man and the environment is still possible thanks to constant research aimed at evolution and innovation. With this spirit we engineer functional urban clothing that together guarantee high performance and Respect for the planet .
Measure to improve. Only what is measured can be reduced. Since 2019, we have been participating in CDP's reporting on Climate Change to direct our efforts towards concrete objectives and certify our path towards Carbon Neutral by 2023.
Sustainable thinking. We have abandoned linear thinking for a circular way of thinking . The design in Esemplare is ethical and sustainable, we design our garments starting from existing resources and we make it through processes of recycling and regeneration of materials. Every end for us embodies the possibility of a new beginning.
Sustainable matter. There are materials that you will never find in Esemplare garments. Then there are the materials, the result of our research , which you will only find in the Esemplare garments. 40% of Esemplare materials are GRS certified.
Act sustainably. We are inspired by concepts of modularity, flexibility, adaptability and we design garments that guarantee performance and quality regardless of fashions and trends. Above all, we make them with attention and care so that they are highly durable over time : this too is a concrete commitment for us to reduce waste.
Social responsibility of the supply chain. Change becomes real only if it is shared .

Since 2013 we have obtained the SA8000-Social Accountability certification, guaranteeing the ethics of our supply chain and production cycle. We require our Partners to adhere to the same standards: 83% of the supply chain is already compliant with the P2020 requirements.
Sustainable future. Between an unsustainable present and a sustainable future we have already chosen a side.

https://www.greenpea.com/partner/esemplare/

6.2.3 Lavazza Headquarters and renovation of the former Enel power station

Fig.56 Lavazza
Source:https://www.lavazza.it/it/museo-lavazza/scopri-nuvola.html

Transformation: Offices

Location: via Bologna, 32, Turin
Brownfield type: Abandoned area
Project type: Renovation, new construction
Architecture Studio: Cino Zucchi
Date of project: 2018
Surface: 30.000 m²
Stakeholder: -
Activities: Offices, bar, restaurant, museum
Pandemic aspect: Yes
Climate change aspect: Yes

About

Nuvola Lavazza includes the headquarters, museum, an archeological site, a restaurant, a bistro, an event space, a gym for employees, an underground car park and a garden square.
It was built between 2014-2018 around the area between via Bologna, Ancona and Corso Plaermo, where at the time there were several buildings largely demolished. A former Enel power plant built in 1897 was redeveloped in the event space, the ENEL staff training building where now it hosts the IAAD - Institute of Applied Art and Design.

Pandemic aspect:

Nuvola Lavazza Hub-CV19 is the largest Vaccine Center in Piedmont, with a potential of 1,700 vaccines per day, 22 vaccination boxes in 1,300 square meters.

Climate Change aspect

Lavazza Headquarters has been developed putting into attention the comfort of people, energy saving and environmental protection. The project of Nuvola Lavazza redeveloped the abandoned industrial area giving the city back the industrial heritage respecting the sustainable approach.
In 2017 Lavazza started to promote the 17 Sustainable Development Goals set out in the 2030 Agenda for Sustainable Development: the UN Global Goals. By this commitment, since 2014, Lavazza has published several Sustainability Reports.
The Lavazza office obtained the Gold level of LEED(Leadership in Energy and Environmental Design) certification in 2017, the system that evaluates the energy-environmental excellence of buildings.

In the global 2019 Sustainability Report of Lavazza “A Goal in Every Cup”, Lavazza group outlined its main achievements , goals and results.
The Nuvola Lavazza reduced its power consumption by 8% in 2019 compared to 2018 thanks to its innovative energy management model.
Moreover Lavazza has carried out a variety of measures to prevent climate change, for instance the extensive reforestation projects. In 2019, 29,000 trees were planted in Ethiopia, about one-million coffee trees planted in Colombia and 36,000 hectares of Amazon rainforest conserved and reforested in Peru.
Furthermore, Lavazza has provided the Corporate Carpooling Program, which promotes sustainable mobility for home-to-work traveling by encouraging the sharing of vehicles among employees in a more efficient way, consequently reducing emissions. The program saved 4,423 kg of CO2 and reduced indirect emissions by 30% in a year.

6.2.4 Parco Dora

Fig.57 Parco Dora
Source:https://www.latzundpartner.de/en/projekte/postindustrielle-landschaften/parco-dora-turin-it/

Transformation: Public Park

Location: Spina 3
Brownfield type: Abandoned area
Project type: Renovation
Architecture Studio: Latz + Partner
Date of project: 2011-2012
Surface: 456.000 m²
Stakeholder: -
Activities: Public park
Pandemic aspect: Not specified
Climate change aspect: Yes “Green Belt”

About

Parco Dora , the large post- industrial park of the city that extends for about 456,000 square meters in the Spina 3 area of Turin, a place where the large production plants of Fiat and Michelin stood up until the 1990s.
It is located between the two banks of the Dora river, in the territory of Spina 4 and 5 of the Piedmontese capital. The park, one of the largest green lungs in the city, has been transformed from an industrial area to an aggregation area where you can walk, play, relax and practice sports. Today it is divided into five lots that bear the name of the production plants that once occupied those areas: Vitali, Ingest, Valdocco (which correspond to the three names of the Fiat Ironworks that stood above), Michelin and Mortara.

Climate change aspect

The general themes pursued by the project concern three main aspects: the visual and functional integration of the park with the river, the aesthetic and functional metamorphosis of the preserved industrial buildings, the connection and dialogue with the rest of the city.
The use of a few “poor” materials (concrete , galvanized steel , gabionade) consistent with the functional language of the industry, as well as simple and durable design details, such as satin curbs made of metal plate, combined a well-kept connections between the different lawn surfaces, in shot-peened asphalt or stabilized aggregates.

The green, joining the other design layers, confirms and supports the main landscape themes; never used exclusively as an aesthetic choice, it is treated for the most part in an extensive form (lawns , tree- lined lawns , avenues), limiting the use of ornamental

flower beds as much as possible.

The environmental sustainability of the park was also developed with particular attention thanks to the use of LED lighting fixtures , adopting innovative reclamation techniques and favoring, in the tenders announced by the City, rather than the economic aspects, selection criteria that brought, at no cost to the Administration, environmental improvements such as offsetting the CO2 (carbon footprinting) produced by construction site activities.

6.2.5 Parco Aurelio Peccei and Docks Dora

Fig.58 Parco Aurelio Peccei

Transformation: Public Park

Location: via Cigna and Valprato, Turin
Brownfield type: Abandoned area
Project type: Renovation
Architecture Studio: -
Date of project: 2011 - Parco Aurelio
Surface: Parco Aurelio Peccei: 27 000 m^2
Stakeholder: -
Activities: Park + Docks Dora magazines: architecture and design studios, small fashion ateliers, recording and music production studios
Pandemic aspect: Not specified
Climate change aspect: Yes

About

Docks Dora

The Docks Dora are located in the heart of one of the main areas of great transformation of the city foreseen by the 1995 Regulatory Plan, the so-called Spina 4. The entire area, already occupied by numerous large-scale industries, is redesigned through the construction of residential buildings, a park, and interventions on the railway axis; in this context, the Docks remain one of the few historical testimonies of the area's productive past. In the mid-90s a substantial part of the spaces inside the structure were abandoned by traditional activities; due to the low rental costs, the extreme flexibility of the spaces and the relative isolation of the complex, new types of activities began to take place: architecture and design studios, small fashion ateliers, recording and music production studios, and above all a night club series.

The complex was built starting from 1912 by the Porcheddu company on a project by engineer Ernesto Fantini, with innovative materials and construction techniques. In particular, the reinforced concrete conglomerate made with the French Hennebique system is used, a system for which Porcheddu is the concessionaire for Italy. The structure of the window covering the courtyards at the entrance to the building is very interesting.

Parco Aurelio

The Spina 4 park was built on a former industrial area of about 43,000 square meters, bordered to the west by the Docks Dora complex, to the east by the new via Cigna and to the south by corso Vigevano; the area, once occupied by the former Iveco-Telai workshops,

is now involved in an important process of urban transformation which involved the replacement of industrial buildings with new residences , commercial spaces and, indeed, a new green area .
The main project objective was to create a large green area equipped to compensate for the chronic lack of green areas in the neighborhood.
Most of the pre-existing buildings were demolished, while it was decided to preserve those that best represented the original character of the area in order to recover its memory and at the same time provide the growing district with a new identity. A significant portion of the Capriate Porcheddu, the so-called “cathedral”, today a place of socialization, events and entertainment, and the water tower, called the “bell tower”, recovered as an element of industrial archeology, were therefore recovered.
The project involved the construction of reclamation works, a system of tree-lined and cycle paths connecting axes, a covering system over the entire surface, grassy and tree-lined areas, the inclusion of a play area of over 1000 square meters. to a multi-purpose sports platform, the recovery of the perimeter wall (Docks Dora local side) and the restoration of the two finds of industrial archeology described above. To complete the intervention, a system of sitting walls and modular furniture was positioned, shaded by a system of steel mesh tensile structures and a system of irrigation and lighting systems.
The design methods saw the involvement, on the one hand, of specific technical professionals such as architects, agronomists and engineers, and on the other, of the didactic circle of the “Gian Enrico Pestalozzi” primary school through which it was possible to complete a participatory planning of the play area, the cycle-pedestrian path and the socialization spaces which therefore represent the technical translation of the outcome of this path, all guided by the expertise of the Tutor Architects of the Sustainable City Laboratory.

Climate change aspect

With its 27 thousand square meters of lawn, 420 trees, a hundred LED lighting bodies, games and tools for young and old, cycle paths and a cathedral that has remained intact to host large gathering and social events, the area is ready to welcome the ideas and needs of its users. Once the construction site is completed, the participatory planning process continues with Urban Barriera, the urban development program started in 2011 and aimed at triggering an overall improvement process of the neighborhood area. A few months ago a work table was set up to meet, discuss and build a rich program of activities and opportunities aimed at the care and management of the park.

Great attention to environmental sustainability

This is due to the fact that the design choices were particularly attentive to environmental sustainability: from the reclamation, carried out on site, with the reuse of non-polluting inert and ferrous materials, to the construction of flooring and the use of paints that activate the oxidative process of photocatalysis. which is responsible for the titanium dioxide (TiO2), which, in the presence of light (ultraviolet rays), breaks down fine dust by inactivating the nitrogen oxide which is washed away with the rains. An oxidation process that already occurs naturally but that photocatalysis accelerates, favoring a more rapid decomposition and avoiding the accumulation of harmful substances.

From the tender procedures - which envisaged the cost of a zero-impact construction site that would balance, through the planting of new trees, the tons of CO2 produced and released into the atmosphere during the works. - to the energy autonomy that the park can count on thanks to the photovoltaic system mounted by IREN on the Porcheddu truss which compensates for the almost 100 LED bodies introduced for its lighting. Up to the aluminum benches, partly from recycled material and the innovative technique used in the nursery for trees, reared in special containers, and then planted without the aid of stakes

FUTURE / ONGOING PROJECTS

6.2.6 Parco San Paolo - Ex Lancia

Fig.59 Parco San Paolo - Ex Lancia
Source:https://www.parcosanpaolo.com/larea-di-intervento

Transformation: multi - functional space

Location: Via Monginevro, Caraglio, Lancia, and Issiglio Turin
Brownfield type: Abandoned area
Project type: Renovation, new construction
Architecture Studio: Studio Mellano Associati - Turin
Date of project: 2015 - ongoing
Surface: 95,000 m^2
Stakeholder: TURIN ZEROCINQUE TRADING SpA
Activities: Pedestrian square for relaxation and strolling, Pedestrian avenue connecting up to the Ruffini Park, Parking and new roads, Senior residence, Business, Prestigious residences
Pandemic aspect: Yes
Climate change aspect: Yes

About

The “Parco San Paolo” project extends over a large area, located in the heart of the historic “Borgo San Paolo” of Turin, the redevelopment program of the former Lancia factory, between Via Monginevro, Caraglio, Lancia, and Issiglio, it is part of the broader framework of recovery interventions of disused industrial areas in the San Paolo district.

The revolution of spaces will have great attention for green areas: they will be made of privately owned spaces, but used for public use. Another phase of the works will see the construction of residential complexes, which will house apartments and offices. Finally, a supermarket will be built.

This is the “Parco San Paolo” intervention, presented by Parco San Paolo and Torri Hf: “The new project extends over a large area, located in the heart of the historic” Borgo San Paolo “in Turin, the redevelopment program of former Lancia factory, between Via Monginevro, Caraglio, Lancia, and Issiglio , is part of the broader framework of redevelopment of abandoned industrial areas in the San Paolo district.

Pandemic aspect:

The idea of a mixed-use project for the area. The project covers an area of 95,000 square meters and provides for the construction of approximately 40,000 square meters of housing and 15,000 square meters for the various completion activities such as leisure, trade and tertiary sector. The interventions will also concern the recovery of a series of existing buildings and new public squares and gardens will be built for approximately 45,000 square meters. Parking areas will also be created for over 1,500 vehicles.

Climate change aspect

Parco San Paolo represents the new way of living in the city: apartments out of the ordinary and with low energy consumption, state-of-the-art technologies, large spaces on a human scale, full comfort, full relaxation.
Designed and built with particular attention to energy saving and acoustic insulation , the buildings have large, bright and easy to furnish rooms, with a wide range of fine finishes. The interiors can be customized according to your needs, your tastes, your way of life.

Parco San Paolo represents the new way of living in the city: apartments out of the ordinary and with low energy consumption, state-of-the-art technologies, large spaces on a human scale, full comfort, full relaxation. Designed and built with particular attention to energy saving and acoustic insulation, the buildings have large, bright and easy to furnish rooms, with a wide range of fine finishes. The interiors can be customized according to your needs, your tastes, your way of life. Some peculiarities:

- Buildings with Class A certification
- Solar panels to naturally exploit the sunlight
- District heating with centralized system
- Air ventilation of the rooms with heat recovery
- Linear video intercom with color monitor
- Video controls of common inputs
- Integrated alarm system for common areas
- Satellite TV for modern digital entertainment needs
- Automatic lift systems
- Wood paneling and granite floors for common areas and entrances

6.2.7 Ex Michelin - ToDream project

Fig.60 ToDream project
Source:https://www.quotidianopiemontese.it/2021/09/15/todream-un-nuovo-distretto-urbano-con-un-mega-mall-nellarea-fra-torino-e-settimo/

Transformation: Commercial and entertainment space

Location: Corso Romania, Turin
Brownfield type: Abandoned area
Project type: Renovation
Architecture Studio: Lombardini 22
Date of project: 2021 - ongoing
Surface: 270,000 m^2
Stakeholder: Romania Sviluppo srl
Activities: Retail, food and entertainment
Pandemic aspect: Yes
Climate change aspect: Yes

About

It was born from the redevelopment of the former Michelin industrial area in Turin where three major road arteries intersect: the Turin A5 ring road, the Strada Provinciale 11 towards Settimo and the A4 Turin-Milan motorway. Phase 1 of the Urban District is scheduled to open in spring 2023.
The ToDream project will be an urban district that integrates shopping, leisure, services, offices and hospitality, within an urban park that will also be the largest commercial center in Piedmont.
The urban district will be developed on a total gross area of 85 thousand square meters of commercial area, services, hospitality, entertainment, with a 45 thousand square meter state-of-the-art open mall where the best national and international fashion and lifestyle operators will be located. and food & beverage.
About 23 thousand square meters will be dedicated to recreational and recreational activities, hotels, gymnasiums; 17 thousand square meters to a large retail park. Everything will be surrounded by a large green area of over 45 thousand square meters where you can relax, play and play sports. The entertainment area - conceived as a fun village for all ages, indoor and outdoor - includes an offer ranging from multiplex cinema to kart track, from adventure trails to sports activities, an event area, game rooms, reality virtual, children's area, edutainment, trampolines and other attractions.

Pandemic aspect:

The urban district will develop a total GLA of 85,000 square meters of commercial / services / hospitality / entertainment area, with a 45,000 square meter state-of-the-art Open Mall. 23,000 square meters will be dedicated to recreational and recreational activities, hotels, gymnasiums; 17,000 square meters to a large Retail Park. Everything will be surrounded by a large green area of over 45,000 square meters where you can relax, play and play sports.

Climate change aspect

The project is naturally based on careful principles of sustainability, which pass through the use of natural materials, the supply of renewable energy for over 1 MW of photovoltaics, the treatment for the recycling of rainwater and wastewater. ToDream aims to obtain the main ESG certifications, achieving the Breeam standard , Very Good level.

Summary

The conducted study showed that chosen post-industrial sites in both the cities of Turin and Lodz showed some principles that correspond to Covid-19 pandemic and climate change aspects.

As in the case of Turin, it is interesting to point out that unlike in Lodz, most of the examples of redeveloped post-industrial sites are adapting to present challenges. In terms of Covid-19 pandemic many structures like OGR, Lingotto or Lavazza were readapting their existing spaces in order to serve the health crisis. OGR, an industrial complex that was redeveloped into an artistic center and scientific and technological research hub, during Covid-19 emergency was transformed into a temporary hospital in order to provide adequate space for the citizens.
As in case of Lingotto, the former Fiat factory and Lavazza headquarters, the former Enel power station, part of the structures were remanaged into Covid-19 vaccination hubs in order to provide efficient and fast distribution of vaccines.
Furthermore, during analysis, already redeveloped post-industrial sites in Turin are adapting their spaces in order to mitigate climate change as in case of Green Pea building in Lingotto area, sustainable solution in Lavazza building or green infrastructures in Parco Dora or Parco Aurelio in Turin.

However if we consider the future and ongoing projects for brownfield redevelopment in both cities we can notice that Lodz is adapting more sufficiently to existing trends. In project Fuzja in Lodz the main principle of the redevelopment is to create a sustainable 15 minute neighborhood where the residents can reach all their needs without compromising the environment and their time. New development projects in Lodz are pointing towards mixed-use spaces and sustainable development while in case of Turin the majority of new developments is compromised by the commercial sector.

CONCLUSIONS

C.1 Outcomes and discussion of the study and proposal of strategies

Most European cities are rich in industrial heritage. Deindustrialization led to massive abandonment of industrial sites that were later put through a process of revitalization and redevelopment.

Despite the plans of revitalization of dismissed industrial zones many of them still remain brownfield areas. These areas are large areas located within the urban environment.

It is necessary to point out the problems that were limiting the redevelopment of industrial sites (and brownfields in general).

This issue was pointed out during my direct survey on the 26th of October 2022 in the meeting in the Città di Torino in Turin with Architect Emanuela Canevaro (the director of the Urban Planning and Quality of the Built Environment Division in Città di Torino).

The main problem that restricts the redevelopment of brownfields in Turin and in all Italy in general is influenced by finding private investors who would acquire these areas and often also bear the costs of remediation of the areas (costs which are often very high). The problem, however, is not only attributable to the acquisition and reclamation costs, but is often also connected to the urban regeneration policies of the brownfields.

During the meeting I learnt that today, the Municipality of Turin addresses these issues in a very direct way as is the case of direct relations with Ferrovie dello stato in the case of the restoration of the former abandoned railway areas.

Although one of the main methods used by municipality in the redevelopment of brownfields areas is based on the adaptation of the Regional Law 16/2011 and the Regional Law 7/2002 (Norme di semplificazione in materia di urbanistica ed edilizia “Simplification rules on urban planning and building”) that allow the Municipality to accept specific interventions and in derogation of the urban planning instruments in force (without the need for a general Urban Variation) if these interventions are justified and consistent with the urban planning policies for the redevelopment of the brownfields areas. This policy has led to results as evidenced by the successes of some important redevelopment interventions in Turin in recent years. Municipality is also using the national law of the consolidated construction law that was updated a few years ago by introducing a concept of temporary use - (L.120/2020) that can benefit the redevelopment of brownfield areas. Buildings or abandoned areas can be transformed and have functions other than those of the ones indicated in the regulatory plan but for a limited period of time 3 maximum 5 years. Municipality is using this law in order to to certify in a non-definitive way any alternative uses of brownfields than those envisaged in the plan.

Similarly, on the occasion of the national congress of the Italian National Institute of Urban Planning held in Bologna between 17 and 19 October 2022, the wide attention was given by the Italian municipalities to attribute the need to make brownfield areas publicly owned and operable on the market that were, often in the past, blocked by their own real estate value which - precisely because it was excessively high - reduced their potential on the market.

All these reasonings converge towards the current debate (also on this topic of the discussion days at the National Institute of Urban Planning in November 2022) relating to the need for Italy - a new law on the principles of governing the territory (this was the general subject of the discussion days of the National Institute of Urban Planning) and - under which law - it is possible to foresee that urban variants will not be necessary in cases

[1] European Commission, (2016a, November 22), Sustainable development: EU sets out its priorities [Press release] https://ec.europa.eu/commission/presscorner/detail/en/IP_16_3883

[2] Mocák P., Kvetoslava B., Matlovic R., János D., 5 7 Pachura P., Prabuddh M., Kostilníková K., Demková M., (2022), 15-Minute City Concept As A Sustainable Urban Development Alternative: A Brief Outline Of Conceptual Frameworks And Slovak Cities As A Case,64, 69-8

where the planned intervention is “in line with the strategic and structural priorities of urban planning”.
This consideration, as can be seen, is an element connecting the debates on a municipal and national scale, and above all, it has one of the main arguments in favor of implementation in post-industrial areas in the coming years.
In the case of the city of Łódź the main objectives that concern the redevelopment of post-industrial sites are presented in “Łódź Revitalization Program 2026+”. The aim of the program was to improve the revitalization processes in Łódź and bring post-industrial buildings back to life. The program is based on a detailed diagnosis of the revitalization area, which shows the negative social, economic, spatial and functional phenomena occurring there. The next step was to determine the area of revitalization that can cover both part and all of the brownfield area. In Łódź, the degraded area coincides with the revitalization area, and its range was established by a resolution of the City Council in Łódź in 2016.
Together with the program the Special Revitalization Zone was established in the entire revitalization area of Łódź in 2017 based on the legal act regulating the revitalization process in Poland - the Revitalization Act of October 9, 2015, which makes it easier for municipalities to carry out revitalization activities as part of the Municipality Revitalization Programs (GPR) adopted by them and enables the use of special solutions such as the Special Revitalization Zone. This Special Revitalization Zone is established in the revitalization area by the City Council for a maximum period of 10 years, and its introduction facilitates the conduct of activities under (GPR) thanks to special legal regulations and special facilities. The Special Revitalization Zone allows the city of Łódź to organize an annual competition for subsidies for the renovation of buildings. Among the projects that are undertaken in the revitalization process are revitalization of Księży Młyn (a group of textile factories and associated facilities) and the successively enlarged New Center of Łódź. In addition to urban investments, numerous mixed-use developer projects are also appearing on the city map such as Fuzja project, WI-MA Widzewska Manufaktura or Textorial Park II.

Still remaining brownfields in both cities posed a question about what is going to happen to these areas in future with present challenges that we are facing such as the Covid-19 pandemic emergency and Climate Change.
Through conducting deep research in order to identify the guidelines for redevelopment of brownfield areas in terms of future challenges it led to final conclusion.
The first conclusion is that unfortunately there is no one common, specific rule for dealing with brownfields areas in Europe in terms of mitigating climate change. “Brownfields remediation, however, is a 2014–2020 EU priority that is incorporated in several policies, such as the 2030 Sustainable Development Goals and Agenda.” [1]
There are few European Union policy frameworks that are related to the redevelopment of the brownfield areas that mention the necessity and importance of sustainable redevelopment of brownfield areas.
In 2002 the RESCUE project was launched in order to integrate the principles of sustainability into brownfield regeneration, defining criteria for the sustainable regeneration of industrial brownfield sites in Europe. The RESCUE project was a confederation of 14 partner institutions from France, Germany, Poland and the UK and it represented a wide range of different stakeholder interests and competences

[1] European Commission, (2016a, November 22), *Sustainable development: EU sets out its priorities* [Press release] https://ec.europa.eu/commission/presscorner/detail/en/IP_16_3883

in brownfield regeneration. Unfortunately the project was concluded in 2005 and did not result in any continuation or update considering future trends in urban regeneration.
In terms of Covid-19 challenge the specific brownfield regeneration guidelines did not exist and are not considered for overcoming pandemic crisis. This phenomenon is understandable and justified since the challenge of Covid-19 is a recent occurrence. Although the Covid-19 pandemic brought back the idea of a 15-minutes city model. It is not a new idea, it was a term made in 2016 by Carlos Moreno, scientific director and professor specializing in complex systems and innovation at University of Paris. Due to these rising issues Covid-19 pandemic and lockdown popularized the concept of a 15-minute city. The concept is about planning housing developments according to the simplest conceivable principle of proximity. Instead of commuting to the other distant parts of the city to fulfill basic needs, you place these services closer together so that it is immediately available and transport is unnecessary.
The main goal of the 15-minutes city concept is that as many daily necessities as possible are available on foot or by bike around the place of residence, including also open spaces and green belts to connect with nature and reduce the feeling of isolation.
“Among the first strong promoters of the 15-minute city concept was the Mayor of Paris, A. Hidalgo, whose electoral strategy “Ville du quart d’heure”, ahead of the successful 2020 elections, included key ideas based on the 15-minute city concept.” [2]
Similar initiatives are being undertaken by: Madrid, Ottawa, Milan, Seattle, Stockholm and Sydney.
The 15-minute city model supports the regeneration and redevelopment interventions for abandoned and dismissed areas in the city.
The concept does not specify that the abandoned areas are brownfield areas and creates a challenge to identify the specific guidelines for brownfield regeneration.
The question of how to adapt our cities following the needs that have emerged from the period of the covid is also of wider debate. Professor Elena Granata in her scientific study (from 2021, Placemaker, gli inventori dei locali che abiteremlo p.41), recalls the theses already expressed by Gehl (Cities for people from 2010) that aim at the need to rethink the way we design our cities, starting from three fundamental rules: “people’s lives, public space and, only in third place, buildings.” [3]
In the planning process, however, the building often comes first. The pandemic of Covid-19 recalls the relevance of Gehl’s thesis which, as Elena Granata comments, is implemented today in the design of adequate and accessible public services, in which the population is at the center of the priority of urban planning. It follows how - in correlation with the tenses of the 15 minutes city - the lesson of the pandemic reminds us of the centrality of Gehl’s theses and above all, the need for attention to the public city and proximity services.
These arguments are certainly of absolute priority in planning the urban regeneration of brownfield areas in the years to come.
After concluding the research the question of regeneration of brownfields areas to overcome future challenges of Climate Change and pandemic were more clear yet there are not any specific guidelines for such redevelopments. In the final conclusion Some concepts were summarized and allowed to provide a simple list of rules that could be followed during redevelopment of post-industrial sites that could mitigate climate change and meet the needs and challenges after global pandemic. Prior to preparation of the list the guidelines were respectively justified.

[2] Mocák P., Kvetoslava B., Matlovic R., János D., 5 7 Pachura P., Prabuddh M., Kostilníková K., Demková M., (2022), *15-Minute City Concept As A Sustainable Urban Development Alternative: A Brief Outline Of Conceptual Frameworks And Slovak Cities As A Case*,64, 69-8
[3] Gehl J., (2010), Cities for people, Iskland press, New York

C.2 Proposal for the main guidelines for sustainable redevelopment of of post industrial sites to mitigate climate change

WHY REDEVELOPMENT OF POST INDUSTRIAL SITES IS BENEFICIAL TO MITIGATE CLIMATE CHANGE?

There are almost 2,000 km² of abandoned industrial sites in Europe.
They are usually located near the city center or within the city barriers.

1. THEY CAN LIMIT URBAN SPRAWL
2. THEY CAN REDUCE DEVELOPMENT OF GREENFIELDS
3. THEY CAN LIMIT GREENHOUSE GASSES EMISSIONS
   (by limiting the transportation distances and time in the city)
4. THEY CAN REDUCE USE OF ENERGY (dense forms of housing)
5. THEY CAN REDUCE USE OF RESOURCES
   (most of them have already existing infrastructures - limit the need of building materials)

PROPOSAL FOR THE MAIN GUIDELINES FOR SUSTAINABLE REDEVELOPMENT OF OF POST INDUSTRIAL SITES TO MITIGATE CLIMATE CHANGE:

1. CLEANUP OF THE SITE AND SOIL REUSE
2. INTEGRATION OF THE REUSE OF BROWNFIELDS INTO THE URBAN DEVELOPMENT
3. PRESERVATION OF THE CULTURAL AND REGIONAL IDENTITY OF INDUSTRIAL HERITAGE
4. PROVISION OF RENEWABLE ENERGY RESOURCES ON SITE
5. MANAGEMENT OF WATER WASTE AND WATER COLLECTION
6. MANAGEMENT OF SITE WASTE
7. USE OF SUSTAINABLE BUILDING MATERIALS
8. PRESENCE OF ADEQUATE AMOUNT OF GREEN SPACES
9. FLEXIBILITY AND VARIETY OF USES OF THE SITE
10. PROVISION OF COST EFFECTIVENESS AND TECHNICAL FEASIBILITY
11. PROVISION OF ACCESS FOR ALL MEANS OF TRANSPORT AND PERMEABILITY OF THE SITE

WHY REDEVELOPMENT OF POST INDUSTRIAL SITES IS BENEFICIAL TO MITIGATE CLIMATE CHANGE?

Rapid urbanization and urban sprawl is the biggest threat in future development of cities. Since most of the post-industrial sites are located near the city center or within the city barriers the redevelopment of brownfields areas can limit the urban sprawl and refine the environmental quality of the cities, limite the development of greenfields and have at the same time economic and ecological benefits. The proximity of these sites can also contribute to reduction of greenhouse gasses emissions through shorter distances in commuting within the city and reducing the usage of cars. The redevelopment of brownfields areas can also reduce use of energy through dense forms of housing and reduce use of resources and materials for new constructions since most post-industrial sites have already existing infrastructures.

MAIN GUIDELINES FOR SUSTAINABLE REDEVELOPMENT OF OF POST INDUSTRIAL SITES TO MITIGATE CLIMATE CHANGE

1. Cleanup of the site and soil reuse

Brownfield areas are usually dilapidated and abandoned areas where many of them can have real or discern contamination problems. They require the intervention and special attention to be brought back to beneficial use and brought back to the economy since they have unfavorable effects on the quality of urban life. The recycling of soil (if not contaminated) can reduce the use of new materials in the brownfield redevelopment resulting also in reduction of cost and time.

2. Integration of the reuse of brownfields into the urban development

The objective of this point is to promote a stable and balanced urban structure of different compatible uses in urban development, such as short distances between home, work and leisure. Mixed structures can contribute to the reduction of mobility demands and can have positive effects on the socio-economic stability and the quality of life within urban areas. The redevelopment of brownfield sites should follow an integrated urban development strategy and should fit into the respective social, economical, cultural and architectural urban fabric.

3. Preservation of the cultural and regional identity of industrial heritage

Most of the brownfield areas possess industrial buildings that have great architectural value and identity within the urban fabric. In order to provide sustainable brownfield regeneration industrial heritage buildings should be handled with great care and reuse them as far as possible in order to promote the identity of the site.

4. Provision of renewable energy resources on site

The adaptation of renewable energy resources and modern energy standards in brownfield regeneration should be one of the priorities in sustainable regeneration especially if we are dealing with already existing buildings on the site which do not comply with present energy standards. Such buildings should be readapted in a way to comply with the modern energy guidelines. In order to reduce the energy demand the presence of renewable energy resources on the site such as solar panels, geothermal energy, wind energy etc. is beneficial.

5. Management of water waste and water collection

The sustainable brownfield redevelopment should take into account the sustainable management of water demand and consumption. The reused and redeveloped buildings should

provide the systems that can minimize the water consumption as well as reduce the water waste collection. The sustainable brownfield redevelopment should minimize the waste generation and apply recycling techniques in order to minimize the costs and redevelopment process. In order to provide sustainable waste management on the site it has to reduce general waste connection, improve recycling and avoid any hazardous waste.

6. Management of site waste and C&D waste

The sustainable brownfield redevelopment should minimize the waste generation and apply recycling techniques in order to minimize the costs and redevelopment process. In order to provide sustainable waste management on the site it has to reduce general waste connection, improve recycling and avoid any hazardous waste. The recycling of construction and demolition waste (C&D waste)(if not hazardous waste) can reduce the use of new materials in the brownfield redevelopment resulting also in reduction of cost and time. To obtain sustainable brownfield regeneration all the possible waste should be reused.

7. Use of sustainable building materials

This objective considers the recycling and reuse of materials located on the site as well as use of new materials that are recycled or can be recycled at the end of life cycle. This principle focuses on circular material economy and materials that have the lowest impact on the environment and can contribute to the better quality of it.

8. Presence of adequate amount of green spaces

The redeveloped brownfield site should fit not only in socioeconomic context but also into a natural and man-made environment. The redevelopment of the site should consider the existing green areas, water conditions, topography of the site and possible contamination. The redeveloped brownfield area should also provide an adequate amount of green and public spaces for the local neighborhood in order to decrease the quality and appearance of the neighborhood.

9. Flexibility and variety of uses of the site

The brownfield regeneration projects for their land use function should fit into its general context and match the demands and needs of the neighborhood.

The redevelopment of the brownfield should comply with the demands that are beneficial to the neighborhood and avoid the unused areas. The regeneration project for the site should propose services and land use that are suitable for the area and enable the social, economic and ecological benefits and link the site with the neighborhood.

10. Provision of cost effectiveness and technical feasibility

The cost effectiveness and technical feasibility for sustainable brownfield redevelopment can be obtained by the point mentioned above. Reuse of soil, materials and good management of site contamination can have benefits to the economical and ecological aspects of the regeneration.

11. Provision of access for all means of transport and permeability of the site

Brownfield sites are usually gated infrastructures that do not let any access to the public, the redevelopment of these sites should consider the permeability of the site for the public and connection with the other parts of the area. The presence of all means of transport in adequate measure (car, public transport, bike, foot, air, ferry, etc.) is beneficial in order to open the planned land use for diversity of population.

C.3 Proposal for the main principles for redeveloping brownfield into 15 minutes cities

HOW REDEVELOPMENT OF POST INDUSTRIAL SITES CAN BE SOLUTION TO PANDEMIC CRISIS?

1. THEY HAVE AMENITY PROXIMITY
2. THEY ARE USUALLY LOCATED WITHIN CITY NEIGHBORHOODS
3. ALREADY EXISTING INFRASTRUCTURES CAN SERVE FOR ADAPTIVE REUSE

WHY ADAPTING 15 MINUTES CITY CONCEPT ON BROWNFIELDS AREAS CAN BE BENEFICIAL FOR FUTURE CHALLENGES OF COVID-19 PANDEMIC AND CLIMATE CHANGE?

1. RESILIENT SOLUTION IN CLIMATE CHANGE IN REDUCING GREENHOUSE GASSES EMISSIONS (reduction of car use, adoption of mixed energy options)
3. REDUCE THE MOBILITY DURING PANDEMIC AND INCREASE ISOLATION

PROPOSAL FOR THE MAIN PRINCIPLES FOR REDEVELOPING BROWNFIELD INTO 15 MINUTES CITIES:

1. A NET-ZERO OPEN NEIGHBORHOOD - SELF-SUFFICIENT NEIGHBORHOOD FOR ENERGY AND RECYCLING (RENEWABLE ENERGY RESOURCES, WATER COLLECTION AND REUSE, LOCAL FOOD PRODUCTION ETC.)
2. FLEXIBLE TRANSPORTATION WITH OTHER PARTS OF THE CITY (BIKE LANES, METRO)
3. CO-WORKING FACILITIES (BLENDED WORKING AND LIVING NEIGHBORHOOD)
4. MULTIPLE USE OF SPACES AND ADAPTIVE REUSE (SCHOOL PLAYGROUNDS USED AS PARKS, TEMPORARY TRANSFORMATION OF SPACES DURING CRISIS ETC.)
5. MIXED-USE NEIGHBORHOODS AND DIVERSITY (DIVERSITY IN RESIDENTIAL, COMMERCIAL AND ENTERTAINMENT ELEMENTS)
6. DIGITALIZATION OF NEIGHBORHOOD (USE OF DIGITAL TOOLS TO IMPROVE THE LIVING)

HOW REDEVELOPMENT OF POST INDUSTRIAL SITES CAN BE SOLUTION TO PANDEMIC CRISIS?

Post-industrial sites are usually located near the city center or within the city barriers. These areas, depending on the time when they were built, are usually located in downtowns of the city, near rivers, railways or other mobility systems. Post-industrial sites are part of urban fabric in the city creating many urban voids. Because of their interurban location they are usually surrounded by many amenities, residential buildings or public spaces where during global pandemics the access to those services in short proximity was crucial.
Moreover most post-industrial sites are already in possession of existing infrastructure and buildings which gives great opportunity to reuse those structures and adapt them into new purpose buildings such as health structures etc.

WHY ADAPTING 15 MINUTES CITY CONCEPT ON BROWNFIELDS AREAS CAN BE BENEFICIAL FOR FUTURE CHALLENGES OF COVID-19 PANDEMIC AND CLIMATE CHANGE?

Covid-19 pandemic accelerated the idea of a 15 minutes city model. A lot of the cities all over the globe adopted a total lockdown where commuting anywhere was reduced almost to zero and all the essential needs had to be satisfied within our home neighborhood. One of the main principles of the 15-minutes city model is strictly bound to mobility. The whole concept is based on the idea to reach all the needs we have within 15 minutes walk without using our car or commuting long distances. In view of Covid-19 pandemic this concept rose to attention because the 15-minutes city model would reduce the mobility of people hence increase their security and distance during health crises. In the view of Climate change, reducing the use of cars would significantly reduce the emissions of greenhouse gasses.

PRINCIPLES FOR REDEVELOPING BROWNFIELD INTO 15 MINUTES CITIES:

1. A Net-Zero Open Neighborhood

The aim of this guideline is to create self-sufficient energy and recycling neighborhoods for water and waste and local food production through community gardening initiatives for providing 0-km food. At the same time the idea is to create permeable communities through pedestrian and green connections in order to avoid the generation of closed, gated neighborhoods and create the mix of social and urban environments.

2. Flexible Transportation With Other Parts Of The City

This guide promotes mobility and commuting within other parts of the city with soft means of transport such as public transport, metro, bike, electric scooter or car. In the 15-minutes neighborhood we can reach all our essential needs within a 15 minutes walk but we should also be able to reach other services that are beyond the limit of our neighborhood with flexible and clean means of transport that do not harm the environment. Moreover the commuting within the city and neighborhood should be more flexible in space and time. In order to achieve that, public transport should not be diminished but enhanced. Bike path could occupy more space than a normal car lane. The means of electrical mobility should be supported by adding more charging stations and engaging in use of shared mobility means.

3. Co-Working Facilities

The idea of this guide is to create a blended living and working environment where the severance between home and work could be more blurred. The time people spend in order to reach their workspace from home is critical. During the lockdown most of the population were forced to work remotely from home which also resulted in lack of adequate space and equipment at home. In order to achieve this home-work model the idea is to introduce more co-working or innovative urban manufacturing or traditional office spaces but also some working cafes or working spaces as one of the main services in the neighborhood. This could reduce the work-home commuting time of many residents but also provide more open and public spaces where people can spend their remote working to avoid the all day stay at home.

4. Multiple Use Of Spaces And Adaptive Reuse

The principle of this point is to promote the idea of multiple use of spaces, scheduled use of spaces for example spaces which during the day have different use than during evening and night. This concept of multipurpose of spaces was presented in the concept of 15-minutes city embraced by the mayor of Paris, Anne Hidalgo where she promoted the ideology that "school playgrounds can be transformed into parks that the public are free to access after school hours."[3]

The idea also promotes the adaptive reuse of spaces where during special events or as during covid-19 crisis the spaces can be readapted for temporary time into other use spaces. The trends are constantly changing and we can not predict future challenges that could happen and in the idea of promoting more flexible spaces that can change their purpose depending on the need can be beneficial and can eliminate the commuting of the inhabitants to recha specific services that are present in other neighborhoods.

5. Mixed-Use Neighborhoods and diversity

This guide focuses on promoting the diversity among residential structures as well as services. In order to have a sufficient neighborhood it should allow all kinds of people of any age, social status and ethnicity to be able to live together to reach that all kinds of housing and residents should be permitted. The mixed-use and diversity should also apply in terms of services where the variety of different amenities in close proximity could be reached in means of 15-minutes walk or bike ride. The diversity in spaces, services and inhabitants could promote cultural diversity, equality but also promote economic vibrancy of the neighborhood.

6. Digitalization Of Neighborhood

With fast developing technology it is important to incorporate possible digital tools into the neighborhood to reduce time for example to run errands or do shopping by implementing online shopping, cashless transactions and virtual communications and interactions. The introduction of shared mobility in neighborhoods like bike sharing or electric scooter or car sharing with charging stations would support the use of sustainable mobility, make the neighborhood safer space for all users as well as increase the quality of environment and neighborhood life.

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[3] Reid C., Anne Hidalgo to Make Good on Pledge to Remove Half of City's Car Parking Spaces Digital:https://www.forbes.com/sites/carltonreid/2020/10/20/paris-mayor-anne-hidalgo-to-make-good-on-pledge-to-remove-half-of-citys-car-parking-spaces/?sh=4a7854f616ec

C.4 Outcomes and analysis

In order to check if these guidelines were sufficient for redevelopment of post-industrial areas, two sites were chosen in both cities of Turin and Łódź to analyze their positive and negative aspects, if their could contribute to mitigation of future challenges of Climate Change and pandemic and to check possible future opportunities. For the Turin site the OGM - Officine Grandi Motori was selected. OGM was a former automobile industry, located in the northern part of the city in the Barriera di Milano district. For the site in Łódź, The former factory of Zygmunt Jarociński was selected, which was a former cotton industry located in the central part of the city in Śródmieście district.

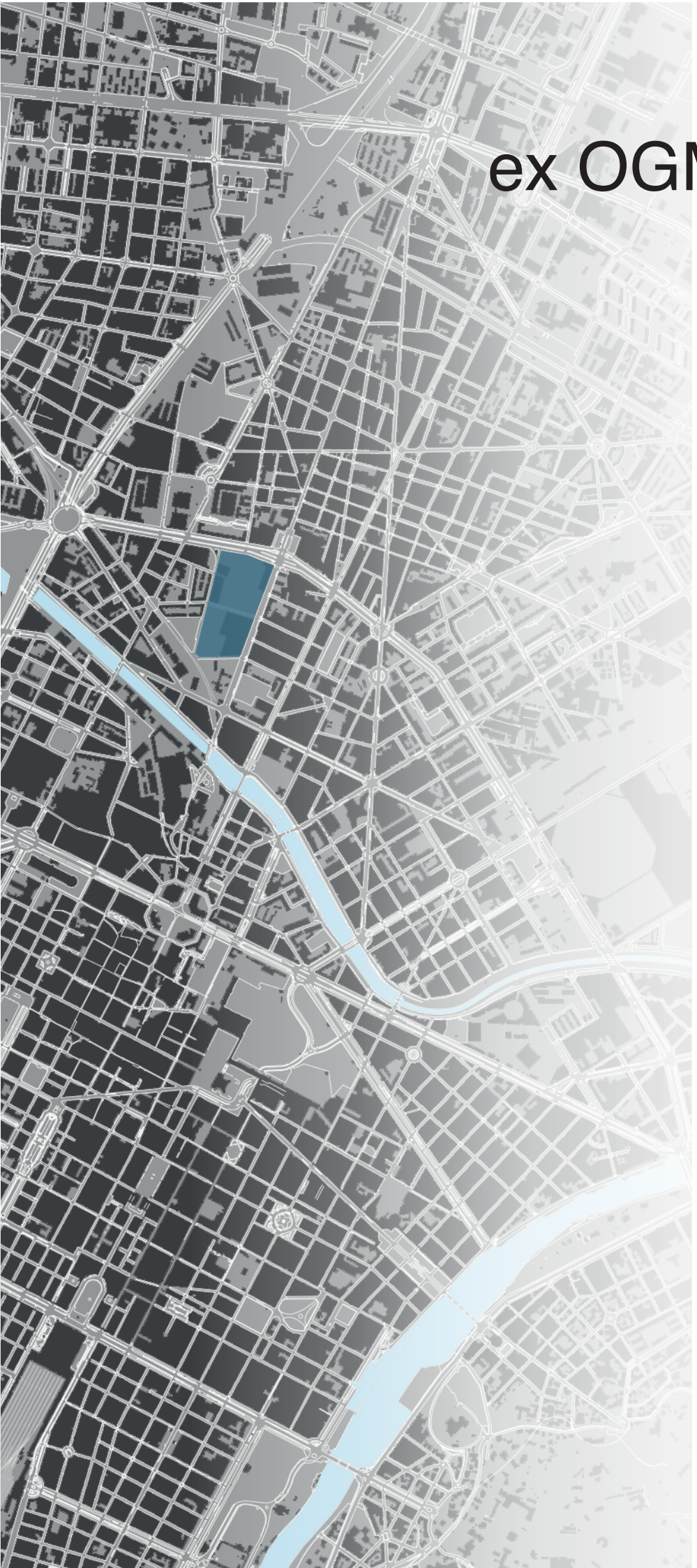
The first analysis focuses on the mapping of developed or under development industrial areas and still existing dismissed, not developed industrial sites in Turin and Łódź.

The other part of analysis goes deeper into detailed analysis of both sites in terms of proximity where the commuting time is studied of both sites to the main landmarks in the city by four main means of transport. To check possible opportunities for future redevelopment and challenges the two sites are also studied in terms of availability of the green areas, services and the existing land use, mobility and specific infrastructures and facilities such as health facilities, co-working, fablabs.

Finally, according to the analysis and the main guidelines for redevelopment of brownfield sites some primary strategies for redevelopment are implemented to understand the workable changes and possibilities.

DISMISSED INDUSTRIAL AREAS IN TURIN

DISMISSED INDUSTRIAL AREAS IN ŁÓDŹ



ex OGM - TURIN

Officine Grandi Motori
Area: 91.167 m^2

ex OGM - TURIN

Officine Grandi Motori

OGM - Officine Grandi Motori was build starting from 1899 designed by Pietro Fenoglio in the first decade of the twentieth century OGM became the property of FIAT, which sold them to Ansaldo in 1916 to repurchase it in 1923 sanctioning the birth of the Grandi Motori section.
The later design was passed to Giacomo Mattè Trucco. At the end of the thirties the area experienced its maximum expansion and occupied an area of 72,000 m^2.
The demolition of the old buildings and the related reclamation of the area began on October 18, 2010. In further years, the former complex of the Officine Grandi Motori has been the subject of a failed redevelopment intervention by a group of private investors.
In October 2017, the Municipality of Turin presented a new project to reuse the area as a university residence, library and storage place for "e-commerce" to the District and residents.
On August 3, 2021, the variation to the master plan was officially approved yet as for June 2022, the works have not yet started.

PROXIMITY ANALYSIS TO THE MAIN POINTS OF INTERESTS IN THE CITY

Center - Piazza Castello	27 min	7 min	14 min	16 min
Dora train station	11 min	4 min	3 min	7 min
Porta Suza train station	30 min	10 min	7 min	20 min
Porta Palazzo market	15 min	4 min	9 min	15 min
Edit - Open Incet	7 min	3 min	2 min	-
Parco Dora - Park	26 min	10 min	6 min	25 min
Parco Aurelio - Park	12 min	4 min	4 min	-
University - Einaudi Campus	29 min	10 min	7 min	26 min
Polytechnic of Turin	46 min	14 min	13 min	34 min

GREEN AREAS

0 100m 200m 500m 1000m

Public green spaces

Semi-private green spaces

Urban green spaces

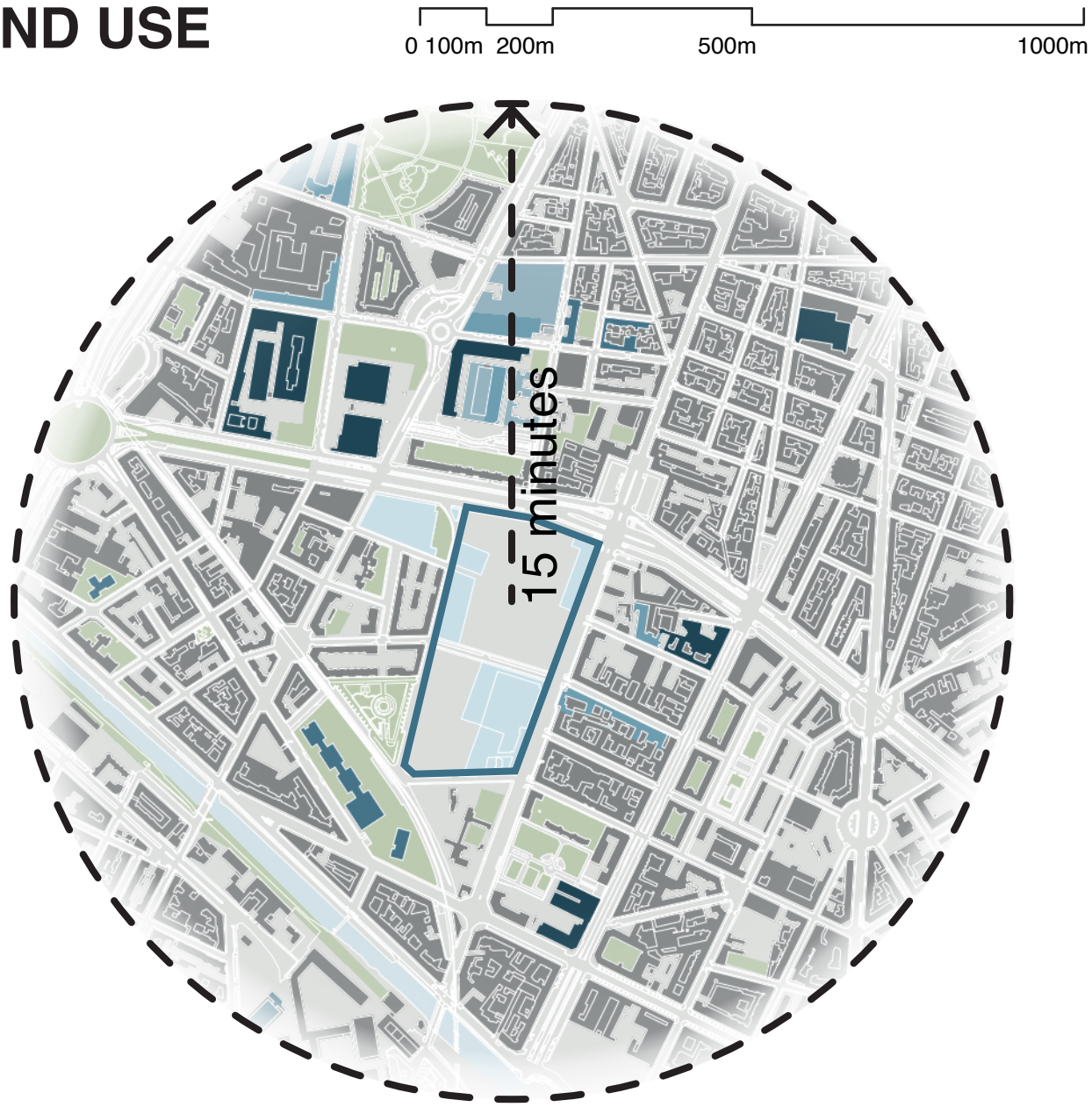
Green roofs

River

Site - OGM - Officine Grandi Motori

Green public areas, parks are located within a 15 minutes walk radius from the site. There is no clear continuity in green areas which gives opportunity for future redevelopment of the site.

LAND USE



- Commercial
- Education
- Offices
- Cultural / Entertainment
- Industrial
- Residential
- Green areas
- River
- Site - OGM - Officine Grandi Motori

Urban fabric is mixed and diverse, consisting of a variety of land uses. The residential sector is a bit lacking which gives opportunities and ideas for future redevelopment of the OGM site.

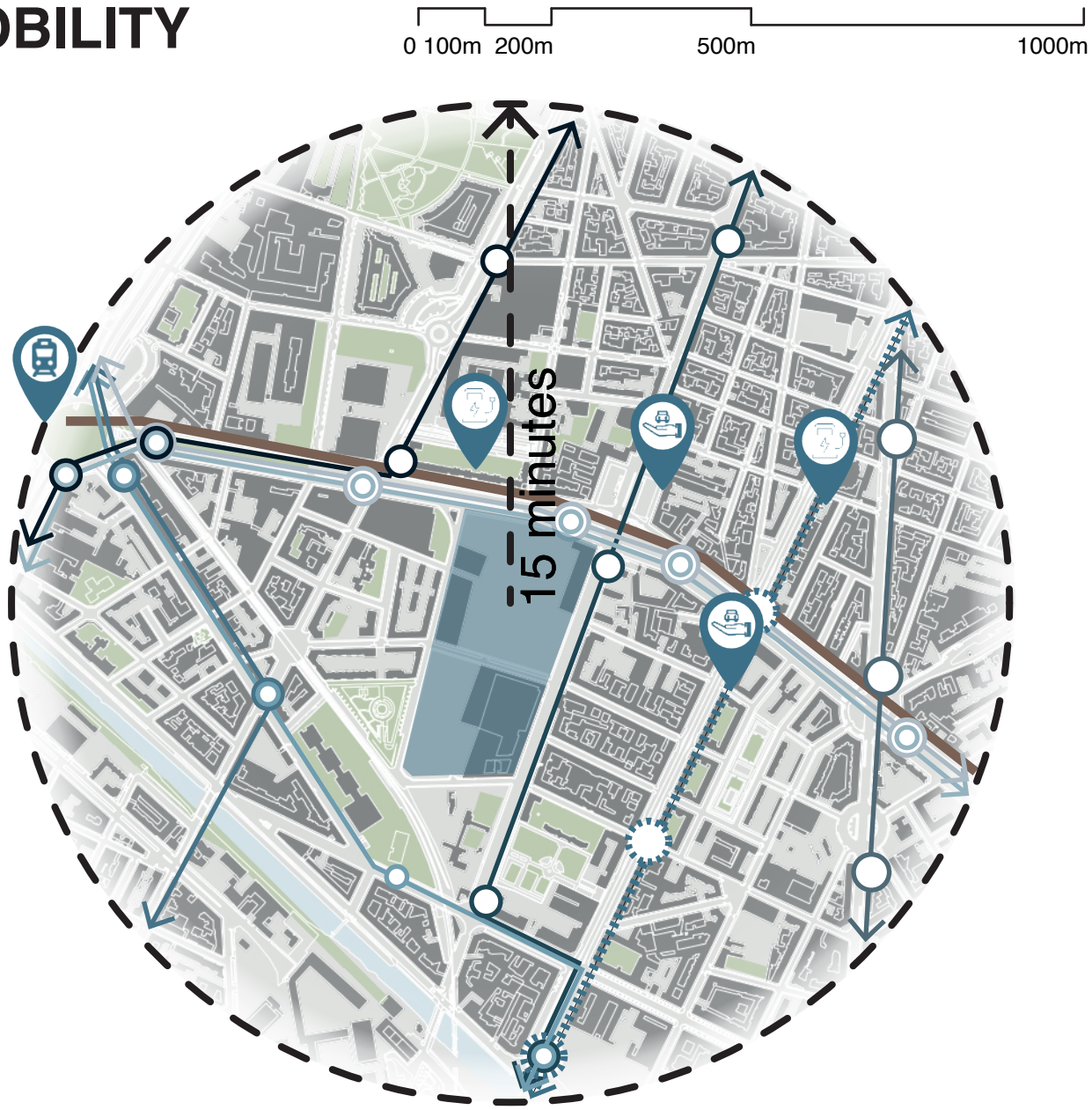
SERVICES

0 100m 200m 500m 1000m

- Museums
- Sports centers (Gym, school gymnasiums...)
- Health care (Hospitals, Pharmacies, Doctors...)
- Beauty parlors
- Education (Schools, universities...)
- Libraries
- Restaurant/Coffee bar
- Food shops
- Shops
- Bars
- Banks
- Car repair
- Hotel
- Post Offices

There is sufficient amount of services in 15 minutes walk radius from the intrest point-OGM.
Opportunity to enrich the site in similar services.

MOBILITY



Bus stops

Tram line

Bus line

Bike path

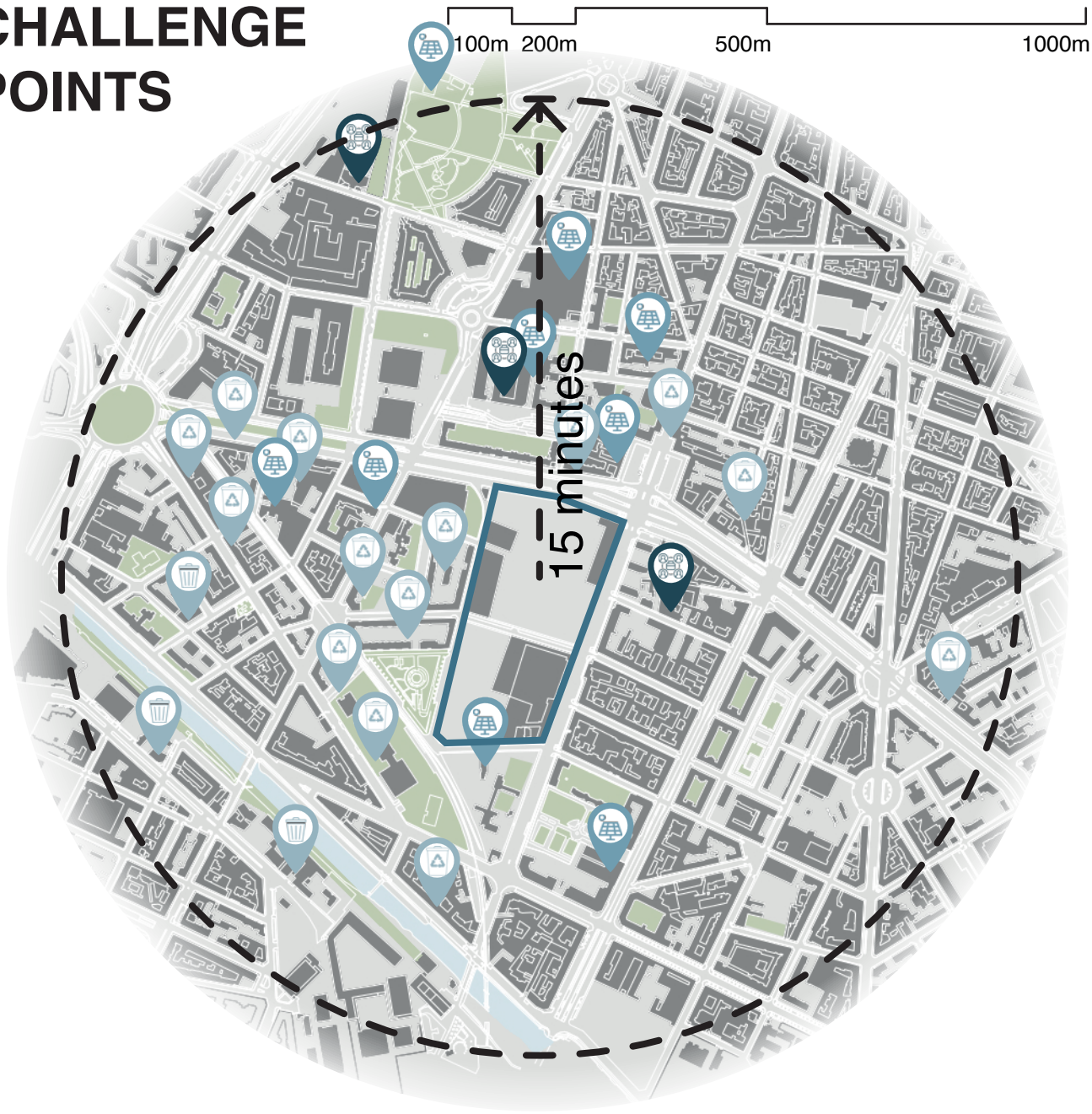
Electric car charging station

Car share station

Train station

Good connectivity with other parts of the city in the means of public transport and sustainable means of transport like bike lanes or electrical car sharing stations located around the site.
Close proximity to Dora train station and connectivity with Porta Susa train station.

CHALLENGE POINTS



Health emergency, Healt care, Hospitals

Co-working/ smartworking spaces

Renewable Energy: Solar Panels

Waste Managment Point

Recyclable bins

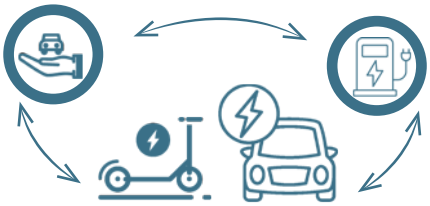
There is a significant lack of health care services within a 15 minutes walk radius from the site.
The provision of health care services in the area can be the opportunity for future redevelopment of the site. There is a great amount of recycle bins and renewable energy sources: solar panels.

STRATEGIES

0 100m 200m 500m 1000m

Accessibility, permeability and integretion into urban development

-Pedestrian paths
-Bike paths
-Public transport
-Shared sustainable mobility

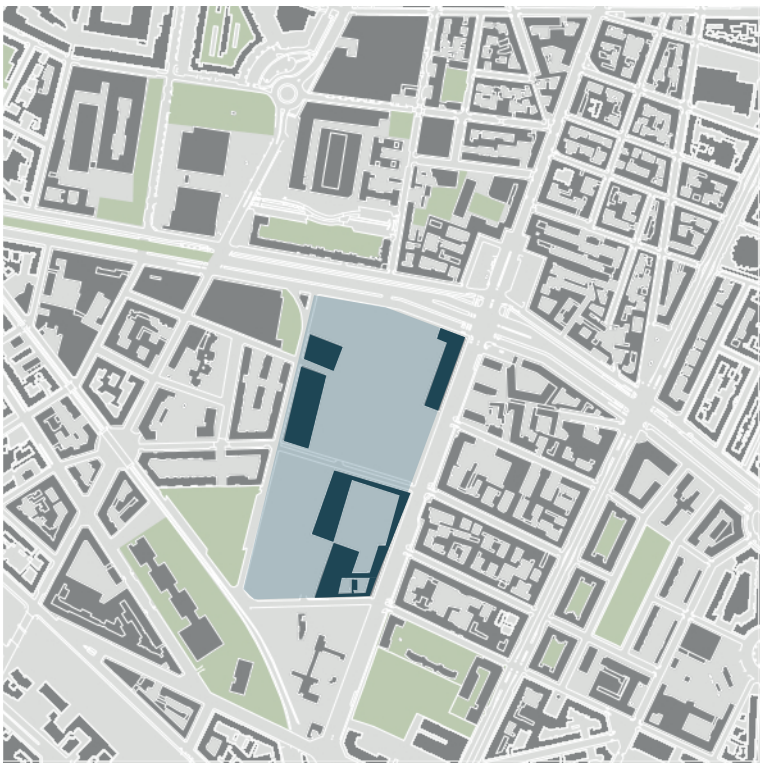


Presence of adequate amount of green spaces and green connections with the neighborhood

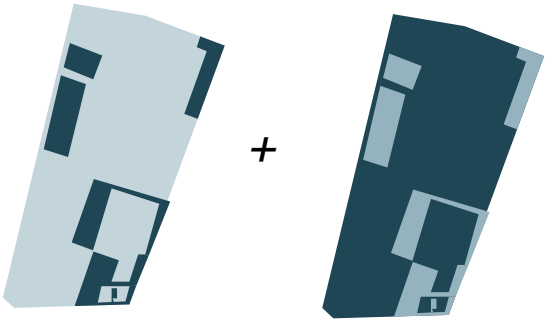
1.Park - Parco Aurelio
2.Park - Parco Dora
3.Park - Giardino Madre Teresa di Calcutta

STRATEGIES

0 100m 200m 500m 1000m



Adaptive reuse of buildings and preservation of cultural heritage



Keep old

Add new

A Net-Zero Open Neighborhood

Recycling and management of site waste

Recycling and managment of water waste and water collection

Renewable energy resources eg.:
-Solar Panels

STRATEGIES

0 100m 200m 500m 1000m

Flexible use of spaces, mixed-use and diversity in services and use

Diversity

Mixed-use

Multiple use

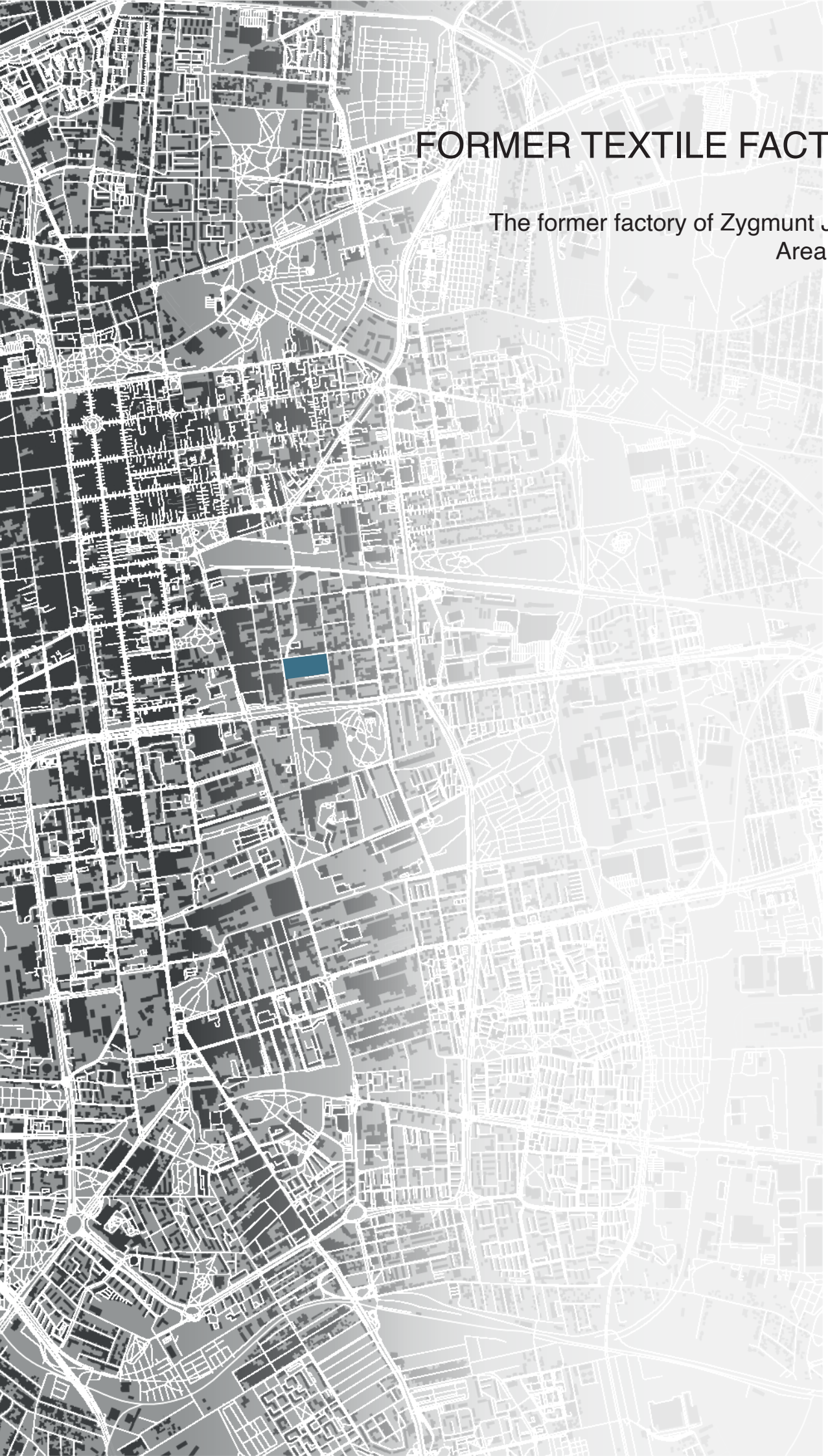
Digitalization and blended living and working environment

Cashless transactions

Digital mobility

Co-working facilities

Virtual interaction



FORMER TEXTILE FACTORY - ŁÓDŹ

The former factory of Zygmunt Jarociński
Area: 9435 m^2

FORMER TEXTILE FACTORY - ŁÓDŹ

The former factory of
Zygmunt Jarociński

In April 2013, on the initiative of the Łódź branch, the Society for the Protection of Monuments submitted an application for entry in the provincial register of monuments of the complex of the former factory of cotton and wool products of Zygmunt Jarociński at ul. Targowa 28/30.
After annual work, by the decision of April 16, 2014 the factory was listed to the register of monuments.
The factory complex is one of the best-preserved examples of industrial architecture with a monumental warehouse building decorated with a tower and the largest preserved 19th-century shed hall of the former weaving mill in Łódź. Most important is the figure of the owner, Zygmunt (Szmul) Jarociński (1823-1909), one of the wealthiest industrialists of Jewish origin. He came to Łódź in the middle of the 19th century and purchased an existing factory at ul. Targowa, then considerably expanded it.
In 1929, the plant was transformed into the joint-stock company Przemysł Włókienniczy (Textile company) by Zygmunt Jarociński. During World War II, Adolf Kebsch opened a stocking factory in the facility of Germany. After the war, the factory was incorporated into the Stocking Industry Plant No. 1, then "Iwona". Currently, the area is put up for sale.

PROXIMITY ANALYSIS TO THE MAIN POINTS OF INTERESTS IN THE CITY

Center - Potrkowska street	15 min	4 min	6 min	11 min
Łódź Kliska train station	44 min	20 min	12 min	20 min
Łódź Fabryczna train station	14 min	2 min	3 min	-
Manufaktura	45 min	15 min	16 min	22 min
Sienkiewicz Park	14 min	2 min	4 min	9 min
Park Źródliska I	12 min	7 min	5 min	-
Atlas Arena Stadium	48 min	19 min	12 min	26 min
University - Law Campus	27 min	7 min	8 min	21 min
Polytechnic of Łódź	37 min	11 min	11 min	28 min

GREEN AREAS

0 100m 200m 500m 1000m

Public green spaces

Semi-private green spaces

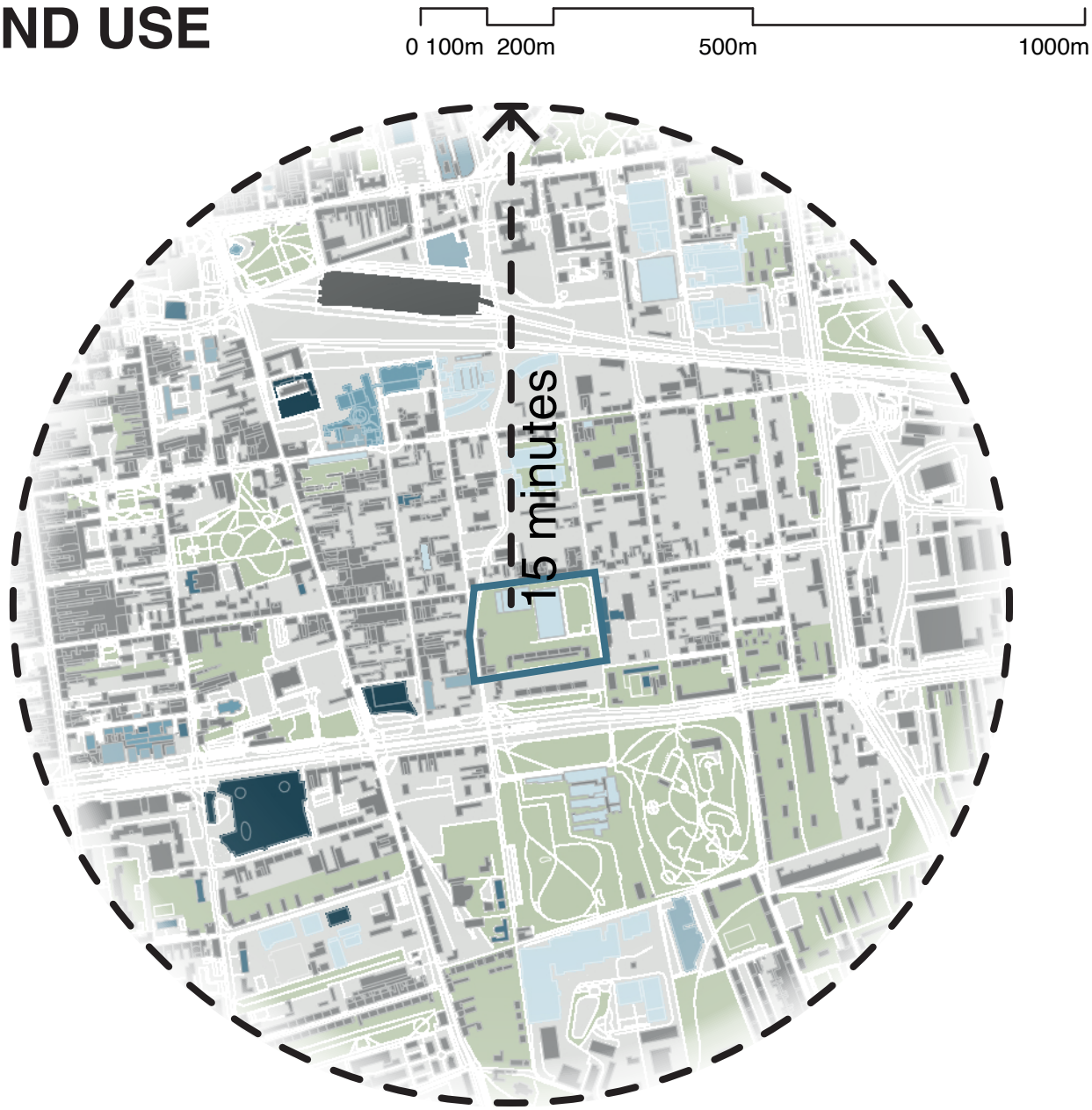
Urban green spaces

Green roofs

Site - The former factory of Zygmunt Jarociński

There is a great amount of green public areas, parks that are located within a 15 minutes walk radius from the site. There is no clear continuity in green areas which gives opportunity for future redevelopment of the site.

LAND USE

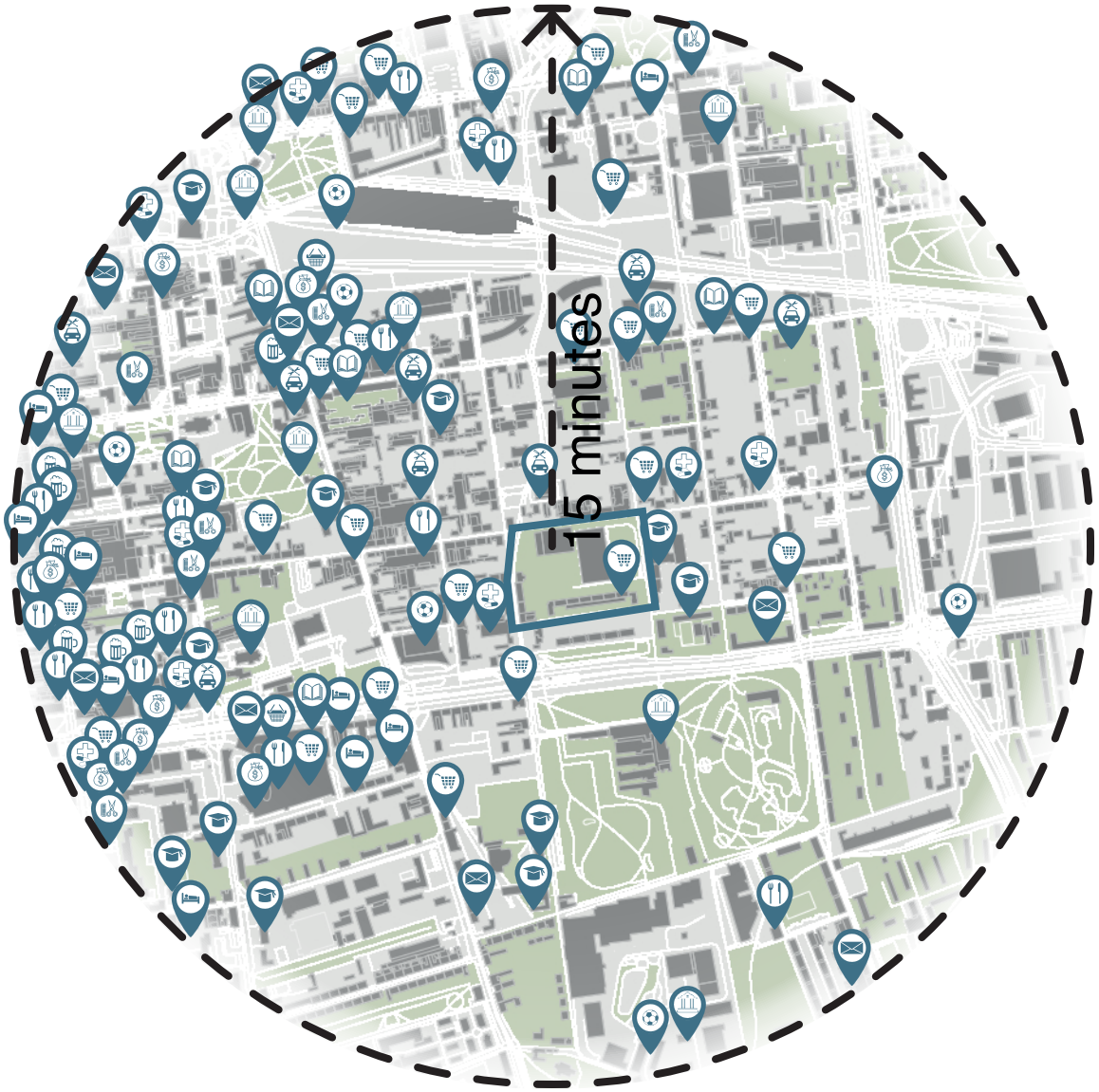


- Commercial
- Education
- Offices
- Cultural / Entertainment
- Industrial
- Residential
- Green areas
- Site - The former factory of Zygmunt Jarociński

Urban fabric is mixed and diverse, consisting of a variety of land uses. There is a higher amount of industrial services around the site. This could be an opportunity to balance the industrial sector with cultural and educational purposes in future redevelopment of the site.

SERVICES

0 100m 200m 500m 1000m



- Museums
- Sports centers (Gym, school gymnasiums...)
- Health care (Hospitals, Pharmacies, Doctors...)
- Beauty parlors
- Education (Schools, universities...)
- Libraries
- Restaurant/Coffee bar
- Food shops
- Shops
- Bars
- Banks
- Car repair
- Hotel
- Post Offices

The services are mostly focused on the west part of the area where the city center begins. There is significant lack of any services on the east part of the neighborhood within a 15 minutes walk radius from the site.

MOBILITY

0 100m 200m 500m 1000m

Bus stops

Tram line

Train

Bus line

Bike path

Electric car charging station

Car share station

Train station

Good connectivity with other parts of the city in the means of public transport, although there are no connecting bike paths or other sustainable means of transport around the site.
Close proximity to Łódź Fabryczna train station and fast connectivity with the Capital of Poland - Warsaw.

CHALLENGE POINTS

Health emergency, Healt care, Hospitals

Co-working/ smartworking spaces

Renewable Energy: Solar Panels

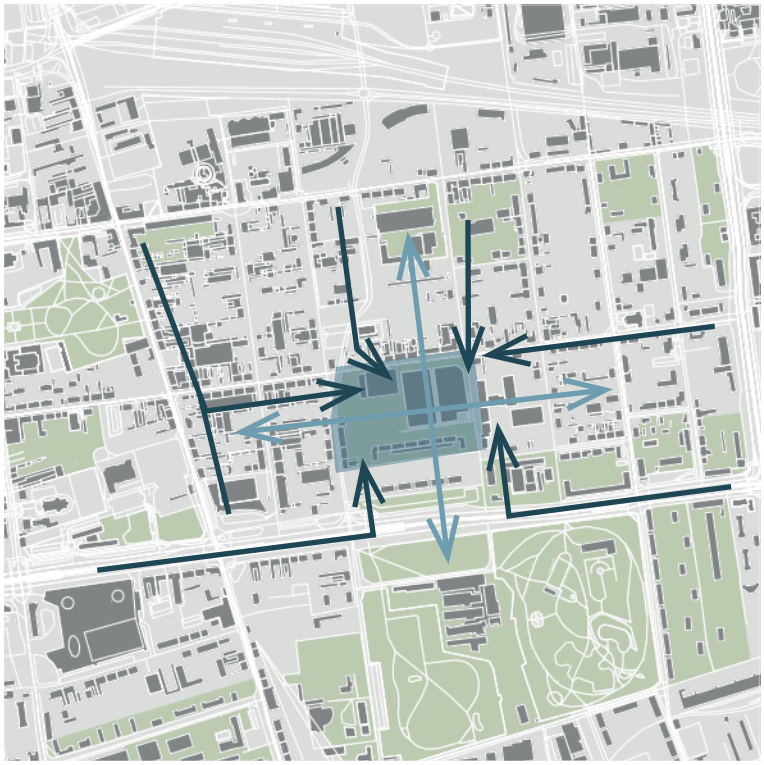
Waste Managment Point

Recyclable bins

There is a significant lack of recycle bins and renewable energy sources: solar panels. within a 15 minutes walk radius from the site. There is a sufficient amount of health care services and hospitals around the site.

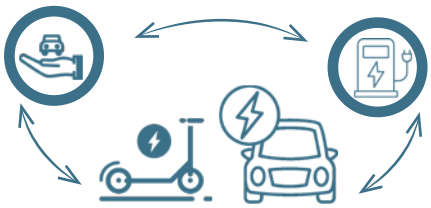
STRATEGIES

0 100m 200m 500m 1000m



Accessibility, permeability and integretion into urban development

-Pedestrian paths
-Bike paths
-Public transport
-Shared sustainable mobility



Presence of adequate amount of green spaces and green connections with the neighborhood

1. Park - Park im. Henryka Sienkiewicza
2. Park - Park Źródliska I
3. Park - Pasaż Abramowskiego

STRATEGIES

0 100m 200m 500m 1000m

Adaptive reuse of buildings and preservation of cultural heritage

Keep old

Add new

A Net-Zero Open Neighborhood

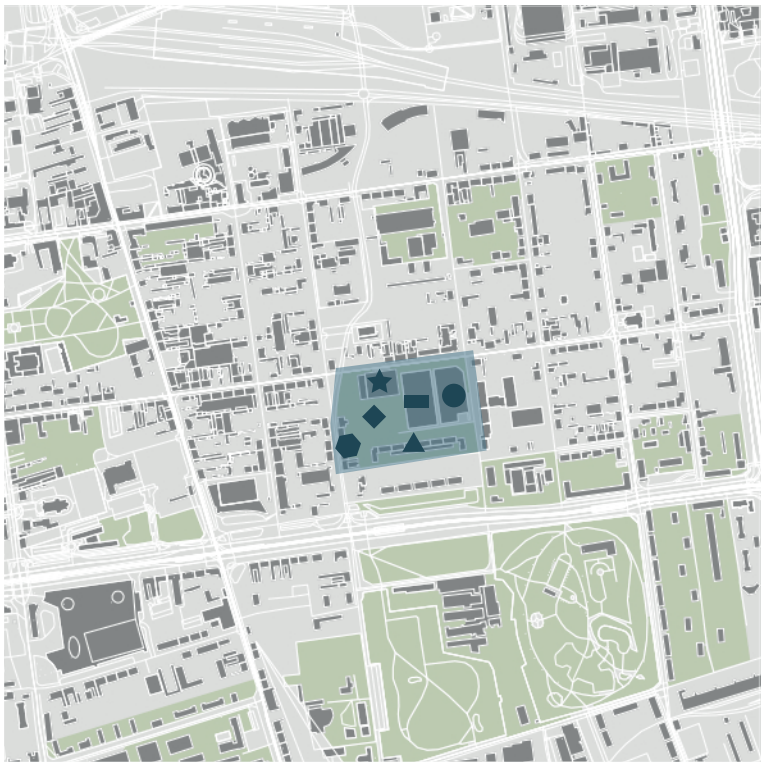
Recycling and management of site waste

Recycling and managment of water waste and water collection

Renewable energy resources eg.:
-Solar Panels

STRATEGIES

0 100m 200m 500m 1000m



Flexible use of spaces, mixed-use and diversity in services and use

Diversity

Mixed-use

Multiple use

Digitalization and blended living and working environment

Cashless transactions

Digital mobility

Co-working facilities

Virtual interaction

FINAL REMARKS

Cities occupy about 3% of Earth's surface and are responsible for over 70% of global greenhouse gasses emission and use 1/3 of global energy. They say that by 2050 almost 85% of the European population is going to live in the cities.
There is a high demand for more sustainable, smarter and climate neutral cities as cities contribute more than 60% of greenhouse gas (GHG) emissions. Cities should redefine some of their urban policies to meet the future needs without compromising today's life. The '15-Minute City' is an emerging concept, currently in application in major European Cities, such as Paris and Barcelona, and quickly gaining popularity as a potent solution for encouraging urban sustainability transitions.
"Estimating the aggregate global GHG emissions reduction of a 15-minute city planning model would be valuable, because vehicular transportation accounts for more than 78% of emissions in urban areas and up to 70–80% of NO^2 emissions, and globally 14% of emissions are attributed to the transport sector." [4]
The application of the 15 minutes city model will lead to the higher density of population and services and diversity that could result in shorter travel distances where motorized traffic is replaced with active travel, leading to lower CO^2 and air pollution emissions and better air quality. The remaining public space could be used for green spaces, contributing to some extent to carbon sequestration and reducing urban heat island effects. Noise levels will be reduced too.

Final considerations and proposals for a continuation of the research

After deindustrialization most of the industries have been abandoned and thanks to new urban policies most of them were restored and reused while others were still left as brownfields leaving big urban voids in the city structure. These voids are large sites located within urban environments which makes them considered as potential for future developments. They are mostly intra-urban areas that are easily reachable by any means of transport thus they give great opportunities for future developments. Instead of developing beyond the city barriers we could stay within those empty sites and redevelop them for something great.

Through the analysis of two sites in both cities of Turin and Łódź showed their positive and negative aspects and gave more clarity to their importance. Both sites are located within urban structure,are incorporated in their neighborhoods that are full of services, green areas and are in good mobility connection. This gives those voids great opportunity for further development of their neighborhoods. In case of the former factory of Zygmunt Jarociński, the site is in very close proximity to the Łódź Fabryczna railway station which has high velocity trains to capital of Poland Warsaw furthermore the amount of public transport and connections with other parts of the city are in great proximity of the site. All the neighborhood has a significant amount of public green spaces in terms of public parks. However in terms of services and land use we can see evident change within the border of the city center, where most amenities are located in the central part of the city leaving the east part more empty. These factors positive as well as negative create great opportunities for

[4] Wiggins B., (2020), *Cars are a major source of greenhouse gas emissions — some cities are finally taking action*
Digital: https://www.globalcitizen. org/en/content/cities-car-bans-greenhouse-gas-emissions

development of new functions that are lacking in the neighborhood.
In the case of OGM the analysis showed that the site is surrounded by a variety of amenities and green spaces. It also has good mobility connections with other parts of the city by means of public transport as well as bike lanes and roads. It is in great proximity and has a fast connection with the Porta Susa railway station which has high velocity trains that lead to Milan.
These two sites are one among many other brownfields in both cities of Łódź and Turin. Their interurban location, large space and large territorial extension give large design and redevelopment chances with regard to climate change but also the implementation of the concept of 15 minutes city that arose during the global pandemic of Covid-19.
In a large area such as the post-industrial areas, large projects are foreseen and therefore in which the initiatives to support the mitigation of climate change can be implemented on a significant scale, as well as elements that became more evident during pandemic such as accessibility to services (primarily medical) but mainly the principles of the 15 minutes cities must inevitably be considered more than in the past such as proximity, diversity or digitalization.

Both cities of Turin and Łódź had been already redeveloping their post-industrial sites also taking into account some current challenges. As investigated in chapter six, some specific case studies were analyzed in aspects of climate change challenge and covid-19 pandemic.
It is interesting to point out that in Turin more than in Łódź, most of the examples of redeveloped post-industrial sites are adapting to present challenges. In terms of Covid-19 pandemic many structures like OGR, Lingotto or Lavazza were readapting their existing spaces in order to serve the health crisis. OGR, an industrial complex that was redeveloped into an artistic center and scientific and technological research hub, during Covid-19 emergency was transformed into a temporary hospital in order to provide adequate space for the citizens. As in case of Lingotto, the former Fiat factory and Lavazza headquarters, the former Enel power station, part of the structures were remanaged into Covid-19 vaccination hubs in order to provide efficient and fast distribution of vaccines.
Furthermore, during analysis, already redeveloped post-industrial sites in Turin are adapting their spaces in order to mitigate climate change as in case of Green Pea building in Lingotto area, sustainable solution in Lavazza building or green infrastructures in Parco Dora or Parco Aurelio in Turin.
However if we consider the future and ongoing projects for brownfield redevelopment in both cities we can notice that Łódź is adapting more sufficiently to existing trends. In project Fuzja in Łódź the main principle of the redevelopment is to create a sustainable 15 minute neighborhood where the residents can reach all their needs without compromising the environment and their time. New development projects in Łódź are also pointing towards mixed-use spaces and sustainable development as in the case of the project for Wi-Ma or Textorial Park II.

Unfortunately there are no specific rules regarding these two important issues such as Climate change or pandemic when we talk about the redevelopment of brownfield areas. The main limits also lay in the municipal regeneration plans of both the city of Turin and Lodz where specific regeneration plans were approved for brownfield areas not considering the new challenges that we are facing now.

As in the case of Turin the latest plan for the city of Turin was approved almost 40 years ago (PGR 1995) and some areas still remain undeveloped. Also the lack of specific policies that deal with regeneration and redevelopment of brownfields areas play a crucial role and raise other limits such as lack of funds for the quenching and tempering of the site and the public-private ownership relations.
In recent years in the case of Turin two new laws arose that could be beneficial and simplify the process of redevelopment of brownfields. During the interview that I conducted in Città di Torino with Architect Emanuela Canevaro I acknowledged these new trends that could open new opportunities for future redevelopment of brownfield areas in Turin.
The high costs of redevelopment of brownfields as well as the lack of current masterplan, in order to support the management of brownfields, municipality of Turin is managing some of these sites on the base of the National Italian law 106 from the 12 of may 2011 translated into the regional law 16 of Regione Piemonte of 3 August 2011 (L.R 16/2002).

Brownfield areas are very fragile territories and need special attention and have to be developed according to different rules than usual greenfields most of all because they can possess contaminated soil or hazardous wastes. And because they are located within urban areas their development should be highly considered especially to limit the urban sprawl and avoid development of greenfields. The attention to the two topics - Climate Change and pandemic in future urban regeneration projects and brownfield development must be considered as priority. This creates the need to provide adequate indicators for both issues in redevelopment of brownfield areas.

In final conclusions I made a very simplified list of possible guidelines for brownfield redevelopment that could help to mitigate Climate Change and apply the concept of 15 minutes city. Those are preliminary strategies and findings that could be the beginning for future development of the research regarding the important matter of redevelopment of post-industrial sites. They mainly focus on proximity, sustainable mobility, mixed-use spaces, adaptable spaces and flexibility. The important issue that should be addressed and pointed out by municipalities of both cities is to make the problem of redevelopment of brownfield areas more evident and incorporated into the strategic planning of the city but also publicly owned and operable on the market. Brownfield areas are specific and unique land that require special attention and can give cities great opportunities in future urban planning redevelopment.

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ANNEX

Città metropolitana di Torino Interview with Arch. Paola Boggio Merlo - TRENTAMETRO Project

On the 25th of October 2022 together with my supervisor prof. Mario Artuso I attended the meeting in the Città metropolitana di Torino in Corso Inghilterra, 7 in Turin with Architect Paola Boggio Merlo. She is head of the "Territorial development and urban redevelopment projects" office. She participated in the TRENTAMETRO project which concerns abandoned post-industrial sites in the metropolitan area of Turin.

"The TRENTAMETRO project is promoted by the Città metropolitana di Torino in partnership with LINKS Foundation, Confindustria Piemonte and Consorzio per gli Insediamenti Produttivi del Canavese." [1]

The first step of the project was to identify all the abandoned industrial areas of the metropolitan territory measuring more than 5,000 square meters.

Then, after a selection of 130 mapped areas only 30 were considered as the most attractive and important ones which were located in close proximity to important services such as railway, airport etc.

"Within the project, a geo-referenced web platform* has been created and made available to the business world, which contains information about the localization of all the mapped abandoned areas, including those not included in the dossier. Moreover, the platform allows interaction with information about the territorial context in which the different areas are located."[1]

Now the project is handled by Regione in order to include it in the regional planning of the metropolitan area of Turin.

During the meeting I performed the interview asking specific questions related to the project and redevelopment of post-industrial sites.

Q1: Some brownfield areas in the province of Turin may belong to private owners, when the site is projected to be redeveloped, how is the private-public ownership managed by the Città metropolitana di Torino?

All the sites that are presented in the TRENTAMETRO project belong to the private owners. Città metropolitana di Torino is not responsible for selling the abandoned areas but can immply the possible offers with compatible proposals. In the dossier of the TRENTAMETRO project there can be found the contact information of the private owners for each listed site that is available for selling. Owners are aware of their sites being listed in the TRENTAMETRO project and are fully in cooperation in order to sell the sites to the investors. Moreover the investors that are usually buying the properties are private investors. The relation of redevelopment of brownfield areas is usually private to private.

Q2: What is the main reason or reasons that these post-industrial sites still remain abandoned? What is the cause limiting the redevelopment of the brownfield areas of metropolitan aera of Turin?

The problem cloud lay in the issue that there are no specific programs regarding the brownfield redevelopment. The problem lay in the private to private relations of these areas and lack of specific aid from government and municipalities.

Turin is also considered as an area of complex industrial crisis - the areas of complex industrial crisis concern territories subject to economic recession and employment loss of national importance and with a significant

[1] Città metropolitana di Torino, (2019), *Attraction Of Investments In The Metropolitan Area*
Digital: http://www.cittametropolitana.torino.it/cms/risorse/sviluppo-economico/dwd/attraz/dossier_30metro_en.pdf

impact on national industrial policy, which cannot be solved with resources and instruments of regional competence only.
Just five out of 30 areas are sold for investments from the TRENTAMETRO project. The main problem of this issue could be the state. After covid-19 everything changed most of all the foreign inventors changed their vision and they are not interested in the investments anymore.

Q3: Brownfield areas usually have some contaminated soil or hazardous wastes on the site. Are the post-industrial sites cleaned up prior to the redevelopment and are there some rules regarding management of brownfield areas?
Some sites have contaminated soil or hazardous wastes on the site. This issue is mentioned in the dossier of the TRENTAMETRO project where under each examined site there is a point which mentions the required reclamation of the site. The sites that are in possession of contaminated soil and hazardous wastes have listed specific operations that need to be carried out. The dimensional indications and reclamation requirements are the most important and most expensive parts of the project and allow proper reclamation and reuse of the site. The information and research about reclamation requirements were collected and studied by Città metropolitana di Torino.

Q4: When the redevelopment for brownfield areas are planned, are there some specific guidelines that need to be followed while dealing with certain sites such as post-industrial sites? If yes, what kind of principles must be acquired during redevelopment?
Private investors must comply with the provided analysis, planification and local plan of the municipality. Private owners that are planning the redevelopment of the brownfield areas must comply with the local planning and guidelines. In order to start the reclamation of the site the municipality must agree and accept the provided plans and include them in the planification.
Private owners that intend the redevelopment of the brownfields follow the rules of the provided master plan; However the masterplan needs to be updated in order to meet the needs of buyers, municipalities can work on master plan principles in order to facilitate the interest of the buyer.
However there are no specific plans only regarding the issue of brownfield redevelopment. There are not any state and local laws that are required and mandatory that regard this issue.
There are a lot of limits that are bound to the redevelopment of brownfield areas and these areas are very difficult to manage.

Q5: Is it useful to include the specific issues regarding former brownfields in the new strategic plan for the metropolitan area of Turin?
Yes it is useful, in fact the Strategic plan for the metropolitan area of Turin 2021/2023 included the TRENTAMETRO project into the masterplan and PTGM - (Piano Territoriale Generale Metropolitano) Metropolitan General Territorial Plan for Turin.

Q6: Are there some specific guidelines for sustainable redevelopment of brownfields that can help mitigate climate change? How climate change and the covid-19 pandemic changed the way of thinking about the redevelopment projects for brownfields? Did the pandemic bring to discussion the idea of 15-minutes city?
No,These issues are not addressed yet.

Città di Torino
Interview with Architect Emanuela Canevaro

On the 26th of October 2022 together with my supervisor prof. Mario Artuso I attended the meeting in the Città di Torino in via Antonio Meucci, 4 in Turin with Architect Emanuela Canevaro. She is the director of the Urban Planning and Quality of the Built Environment Division in Città di Torino - Urban Planning and Private Building Department.
During the meeting we discussed the issue of abandoned brownfield areas in Turin, their relationship with municipality and redevelopment projects.

Q1: Turin still has remaining abandoned post-industrial sites and brownfields such as ex-Osi ghia, Ex Nebiolo or OGM - Ex Officine Grandi Motori. Most of them have existing projects of revitalization but they remain untouched for many years. What is the main reason or reasons that these post-industrial sites still remain abandoned? What is the cause limiting the redevelopment of the brownfield areas of Turin?

The mentioned examples above are abandoned but some of them are already objects of urban redevelopment plans in particular OGM and Ex Nebiolo that are going to be approved in a short time. In case of Ex-Osi ghia or other areas that are abandoned without any development plans the issue lies mainly in the differentiation of territory and their surrounding. Some of the areas may attract more private investors for redevelopment of brownfield areas in Turin.
One of the biggest problems that limits the redevelopment of brownfield areas is "Bonifica" , the cost of quenching and tempering the site. The urban restructuring does not have such high margins to cover and amortize reclamation costs of brownfield areas.
Ther other issue limiting the redevelopment of these sites is the dimensions and economic feasibility of private investors that influence the functions that can be placed in such areas. Moreover the most attractive functions for private investors lay in commercial use.
For example the area Ex-Michelin the former industrial area in Turin, the area is the subject of a set of agreed executive plans connected with the masterplan that are being developed now. In the area of Ex-Michelin there are strong attractive and profitable functions which can be inserted in this specific place and not others. The area has desirable dimensions and brings necessary infrastructure that can sustain those functions.
The reconstruction of Corso Romania will provide the passage of the highway which today is at the end of the dismissed railway line. There are many works that need to be carried out but the intended use is rich enough to generate the resources that allow the development of the area and the realization of the connected infrastructures.
In case of OGM project there is unfortunately again the commercial anchor because in the last 20 years the major part of the revitalization of these brownfields has supported that commercial destination. This issue brings behind the priority for other functions, residential structures and services.
The other examples are the redevelopment project of Ex Scalo Vallino(ex railway yard) in via Nizza and Ex Scalo Vanchiglia (ex railway yard) in Corso Regio Parco which are also destined for commercial use.
The area of FCA in Corso Settembrini where there is the faculty of design of Politecnico di torino. This area was acquired by a public departmental company and there is a private-public relationship. The Politecnico di

Torino bought the major part of the site together with some small and medium, private enterprises. These gave the opportunity for some funds from the municipality of Turin that the public can use to trigger actions to public as well as private investors in order to manage the site.
In that case, there was also an intention to provide the commercial anchor there, a lot was bought by the "coop" company that planned to make a large, commercial structure.
At the time the construction of another commercial plate was started with the 106 law in the area of FCA.
Another example of a brownfield area that is undergoing redevelopment is the historical tobacco factory in Corso Regio Parco. This is the state property, public property.
The state pivoted and attracted other public entities such as: the University of Turin, Turin Polytechnic, Turin Court, Turin City. Some of these owners already have all the needed fundings others are gathering them in order to continue the redevelopment project.
Now municipality of Turin with the help of the Turin Polytechnic is defining the functional master plan of the area where the main destination of this site is: the active deposit of all these bodies, more classrooms, more teaching centers and the possibility of using the objects of the archive to form study poles and also possibility to work with those materials, plus a part dedicated to student residence.
The municipality, through various measures, chooses abandoned areas of public property because the state can cover the costs of the reclamation. There needs to be an investment on the brownfield that allows to pay for profit-making transfers, a fund that helps to pay for the reclamation. The issue also concerns the policy that does not allow development of greenfields and promotes zero land use rule which in result forces the city to focus redevelopment on the brownfields areas. In order to cover the costs of reclamation in brownfield sites the implementation of European policies on loan could be used that EU will provide along with PNRR main plan.
For example in redevelopment of one of the "Spina" areas, the former railway, the costs of reclamations were paid by the state.

Fig.61 FCA site - Polytechnic Citadel of Design and Sustainable Mobility, Corso Luigi Settembrini, 178
Source: ICIS
https://www.icis.it/portfolio/cittadella-politecnica/

Fig.62 Former Tobacco Factory, Corso Regio Parco
Source: (ANSA) - Torino, 23 Julay 2020
https://www.ansa.it/piemonte/notizie/2020/07/23/rinasce-ex-manifattura-tabacchi-torino_30c85af8-26aa-401d-a879-87a6a4cb21cc.html

Q2: Some brownfield areas in Turin may belong to private owners, when the site is projected to be redeveloped, how is the private-public ownership managed by the municipality?

Private investors do not intervene without municipality, in Italy the masterplan is a juridical plan and municipality is always involved however due to private ownership of majority of sites have had already specified urban interventions and redevelopment plans that derive from 1995 masterplan.

Master plan is very old because it was approved in 1995, it has undergone more than 300 variations and the studies were started in the 80s, 40 years ago. Some interventions that were mentioned in the masterplan were carried out and some not as in example of one of the "Spina '' projects, the railway was dug out and redeveloped, it was a structural intervention of these 20-30 years of Turin.

On the issue of the point of reuse, the master plan identified areas called urban zones of transformation ZUT that regard brownfields. For each one of them the master plan has made a mini urban project, some have been implemented and are still in the phase of closing, others unfortunately not. The first activity in order to prepare a new master plan was to review areas implemented, partially implemented and not fully implemented. The difficult task was to recondition all the areas that were not implemented, understand why they have not been implemented, which were the problems that limited the redevelopment and study the current rule in a preparatory way to overcome all the issues that did not let the redevelopment of these areas.

After the analisis there is still the problem of the property. There are some sites that have private-public relationships. In Turin there are two public institutions that can suit many disused productive areas, one of them is Ferrovie dello Stato - railways. There are still some that state that areas that belong to Ferrovie dello Stato that have not been subjected to the transformation but are the object of redevelopment plan for one of Spina projects mentioned in the masterplan.

One of their projects Ferrovie dello Stato through their real estate company which is called urban systems - Sistemi Urbani a discussion was opened to analyze the point of their property, the proposals that they apply in order to make those areas more attractive and interesting on the market.

What we can do today with the new urban masterplan, most of the brownfield sites are property of some state agencies such as the railway. New skyscraper will be built in front of Renzo Piano one. The Italian railway public firm - Ferrovie Italiane has found a proper real estate agency called sistemi urbani. This real estate agency is talking with the municipality to work together in order to figure out which kind of new services to provide with the new master plan in this site to make this site more attractive. In order to provide new services such as accessibility to ex:healthcare.

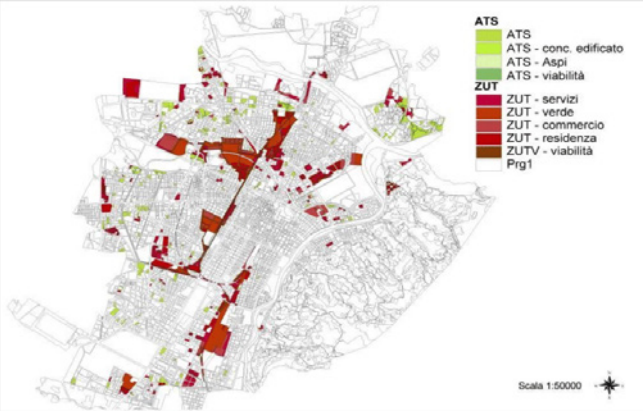

Fig.63 The regeneration of the city based on the abandoned industrial areas of which have become "Urban Transformation Zones (ZUT)" and "Areas for tertiary and services (ATS)" Source: PRG Turin, 1995

New master plan with cooperation with the real estate agency and Italian railway public firm Ferrovie Italiane will provide some services and facilities in abandoned areas that will be useful to attract investors.

Another phenomenon of disused industrial areas that in the last 10 years appeared derived from the law 106 then translated into the regional law 16 of Piedmont that gives the possibility to present building permits in derogation to the destinations of the plan. This norm gives the possibility to request permits to build and act on abandoned areas and permits to change the functions and destinations in these areas that are different from those presented in the masterplan. This norm became attractive for private investors because they could choose the areas with the most interesting cost-benefit characteristics on the territory and insert functions that will increase the profitability and allow them to support operations. Many investors transformed these sites again towards the commerce sector which was not included in the masterplan. This phenomenon was not only considering areas from ZUT - urban zones of transformation but also simple punctual abandoned buildings. This phenomenon, on the one hand, has made it clear that the plan prediction is more consistent with the market interest of the entrepreneur and with the interests of the economic activity. On the other hand, it was a bit of a surprise because we are implementing forecasts that are not in the regulatory plan. The master plan will have to recognize and understand these changes because before some areas were meant for the production sector now is all about commerce or other facilities that are different from those predicted in the master plan.

Another important thing, the national law of the consolidated construction law was updated a few years ago by introducing a concept of temporary use. Temporary use is based on use of a building or an abandoned area with functions other than those of the ones indicated in the regulatory plan but for a limited period of time 3 maximum 5 years. Municipality is using this law to begin to certify in a non-definitive way any alternative uses of brownfields than those envisaged in the plan. At the end of the 5 years of experimentation with new functions the site is studied and monitored and if the use did not go well, it did not contribute to enriching the territory and neighborhood; it is removed from the area and not considered in the master plan. On the other hand if this temporary use has been successful, it has brought light and life to that place it automatically allows to make the variant of the master plan and consolidate this intended use. This law is used by the municipality of Turin as a tool in order to test possible new services that were not mentioned in the master plan in sufficient and time relevant ways.
These initiatives were started by the municipality of Turin this June one of the examples was politecnico di Torino that had the need for more space for classrooms which use container structure and placed it in the area that was abandoned parking lot. Another case where the temporary use was implemented was placing the main office of Flashback association in Corso Lanza 75, in space that was rented from the cultural association. There is another case where in a small abandoned industrial site the artist changed the space into the storage area for his work and small office.

Fig.64 Flashback Habitat, Ecosystem for Contemporary Cultures in Corso Lanza 75
Source: Artribune

Q3: How the Covid-19 pandemic changed the way of thinking about the redevelopment projects for brownfields? If it changed at all?

The other day I met with an engineer who is not a designer but a developer and he referred to the Covid-19 issue. Immediately after the covid pandemic he had a flood of requests to redevelop production areas into logistics. It all came with the modality of online shopping during pandemic. After the pandemic he had so many requests for new expansion magazines of those existing ones and he found himself displaced, he was not ready and prepared and could not fully answer those requests. Mainly because these people that intend to expand their firms do not have the necessary information concerning territory etc. They want to expand their land beyond but this implies the consumption of the soil.

I also spoke with the regional manager of the environment of urban planning, we had some discussion. Not everything is technical and economic because politics is the one that decides where to place funding, first of all is a certification and political choices must be there.

There is the whole theme of the relationship from the private one that we should somehow investigate in the context of our planning. The private sector is expressed in the Italian representation, there is the representative of the industry, small and medium-sized enterprise and the representative of the artisans. We cannot make a territorial policy on economic activities and including those of trade without feeling the representation of the needs of these subjects.

The engineer is a manager for real estate investors and after covid-19 there was significant rise in demand for the marketing study sector of new logistic sites. Covid-19 pandemic increased online business for example: food and raised at the same time the need of sites to locate the logistical hub for these firms that are providing online commerce services. This issue could be addressed to redevelopment of brownfield areas that could provide the efficient amount of space for logistic sectors. The challenge was to attract logistical firms to locate their logistical hubs for the commerce facilities for example: Amazon hub. The municipality with the development of a new master plan is working on redevelopment of brownfield areas that were not managed in the past and the need for the logistic facilities could be one of the opportunities for such sites. The municipality is studying which sites could be suitable due to their position, proximity to include them into this type of site.

The relationship concerning the public-private ownership is now being managed during the development of a new master plan involving the private associations that are working with municipalities in order to identify which kind of services could be delivered in order to attract investors. Is the same logic that municipality did with the railway where the redevelopment

was managed by real estate.

The municipality is working in order to address the main problem regarding the redevelopment of brownfield areas. One of the issues is to continue the redevelopment as it was indicated in the 1995 master plan but also to solve the problems that cause the delay in development in the last 20 years and identify present issues such as Covid-19 and consider their possible involvement into redevelopment of brownfield areas. The issue of providing the logistical hubs could be one of the main points that municipalities could incorporate into new plans for brownfield areas redevelopment.

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2	7	Industrial area - PIP4	Nichelino	Corso Vittime del Lavoro	https://live.staticflickr.com/65535/48748453751_55aaf176a3_o.jpg
9	18	Area In1 Via Maestri del lavoro	Grugliasco	Via Maestri del Lavoro	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
46	138	Area mf26	Settimo Torinese	Strada Cebrosa	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
48	11	FONTANETO 2	Chieri	Via dell'Industria	https://live.staticflickr.com/65535/48748635897_266fa35d93_o.jpg
52	28	Industrial areas - Pi11, Pd, Area n.3	Settimo Torinese	Strada Cebrosa/Via Reisera	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
53	29	Industrial area - Strada Cebrosa (Mf7)	Settimo Torinese	SP 3 - Cebrosa	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
61	139	Area Pi15 - ex cascina fiorita	Settimo Torinese	Strada Cebrosa - Via Nenni	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
50	19	Area Industriale Via Rivalta	Grugliasco	Via Rivalta	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
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16	56	Tomaino marmi	Castellamonte	Strada del Ghiaro Inferiore	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
145	144	Industrial area MONTEPÊ	Trofarello	Via Vittime di Piazza Fontana	https://live.staticflickr.com/65535/48748118143_903d4e588a_o.jpg
113	126	Area BD1052	Torrazza Piemonte	Strada Cascina Rassa	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
148	149	Pi12 BORSETTO	Settimo Torinese	Viale Kennedy	https://live.staticflickr.com/65535/48748453831_37e41d02ca_o.jpg
150	151	Mf24 ECOALPI DUE	Settimo Torinese	Via Cascina Bormiola	https://live.staticflickr.com/65535/49157123191_dd82b64c45_o.jpg
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74	35	Industrial building - Via alle Fabbriche	Caselle Torinese	Via alle Fabbriche	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
5	12	Ex Comau	Beinasco	Strada Torino	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
40	107	Capannone in vendita	Roletto	Via Roma 130	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
19	147	Ex TRECI Spa	Settimo Torinese	Strada Caffadio, 24	https://live.staticflickr.com/65535/48748453936_6998c23456_o.jpg
0	5	Industrial building - Corso Savona	Villastellone	Corso Savona, 45	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
18	61	S.i.b.a.c. s.r.l.	Castellamonte	Strada Bairo	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
4	10	Ex EMBRACO	Riva presso Chieri	Via Buttigliera, 6	https://live.staticflickr.com/65535/48748117923_50593446be_o.jpg
87	62	Industrial area	Pont Canavese	Via Caviglione	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
21	68	ex F.M.T.	Riva presso Chieri	Via Giovanni Agnelli 16	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
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136	79	Capannone in vendita	Caselle Torinese	Via Argentera	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
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78	44	Sferal Wwt	Caluso	Via Martiri d'Italia	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
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101	99	Capannone in vendita	Ozegna	Via Faulenta	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
102	109	Industrial area DAA-Bp7	Venaria Reale	Via Don Sapino 176	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
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147	146	BUSINESS PARK	Ivrea	Strada Bersaglio	https://live.staticflickr.com/65535/48748453621_cf6afc191f_o.jpg
110	122	Capannone in vendita	Volvera	Strada provinciale Piossasco 43	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
111	123	Capannone in vendita	Volvera	Via La Bruina	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
123	31	Ex conceria	Borgaro Torinese	Via Risorgimento	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
58	108	Capannone in vendita	Roletto	Via Roma 93	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
66	4	Industrial areas - I2-3	Candiolo	Via Pinerolo	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
96	89	Capannone in vendita	Leini	Via Torino	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
131	65	Ex Elea	Ivrea	Via Massimo d'Azeglio 69	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
116	130	Ex SAIFA	Foglizzo	Via Artisti 8	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
117	131	Ex Tessitura Tabasso	Chieri	Via Vittorio Emanuele 1	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
114	128	FORNACE GHIGGIA	Torrazza Piemonte	Via San Nicolao, 43	https://live.staticflickr.com/65535/48748117753_0746d083a8_o.jpg
12	37	Ex caritiera Reno De Medici	Cirie	Via Remondi	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
13	45	Ex EATON	Rivarolo Canavese	Via Bicocca, 28	https://live.staticflickr.com/65535/48748453491_403595cd2e_o.jpg
1	6	Ex Roasio - Ex sede della Docks petroli	Trofarello	Via Torino	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
86	60	Ex Elettrometallurgica spa	Cuorgne	Cascina Dallo	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
76	41	Antica Conceria Canavesana	Cirie	Cascina Vesco	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
141	140	Ex BRONDI	Settimo Torinese	Via Mappano	https://live.staticflickr.com/65535/48748118198_5c9a19a3ae_o.jpg
10	23	Ex BURGO	San Mauro Torinese	Via Luigi Burgo	https://live.staticflickr.com/65535/48748635922_16a5ddee0e_o.jpg
31	94	Ex LIRI	Nichelino	Via Vernea 2	https://live.staticflickr.com/65535/48748453986_197b3cef68_o.jpg
34	101	Industrial area - PR14	Rivarolo Canavese	Via Camillo Olivetti 3	https://live.staticflickr.com/65535/48748635717_76a3a2f926_o.jpg
67	21	Ex Bertolini	Collegno	Corso Francia	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
70	27	Ex Martini	Venaria Reale	Via Zulian	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
30	93	Ex ILTE	Moncalieri	Via Fortunato Postiglione	https://live.staticflickr.com/65535/48748636192_7d63790ea3_o.jpg
80	50	Ingram, ex Valle Susa	Rivarolo Canavese	Via Cristoforo Colombo	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
137	124	Ex comprensorio Olivetti	Ivrea	Via Torino 18	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
144	143	Ex ALPESTRE	Carmagnola	Via Gruassa 6	https://live.staticflickr.com/65535/48748117678_b784460d1c_o.jpg
146	145	Ex PIRELLI	Settimo Torinese	Via Torino, 91	https://live.staticflickr.com/65535/48748118128_edb9f93e4c_o.jpg
125	39	IPCA (Industria Piemontese dei Colori di Anilina)	Cirie	Localita Borche	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
139	132	Ex Fiat Allis	Nichelino	Via F. Bernardi	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
154	155	Ex BULL	Caluso	Via Martiri d'Italia	https://live.staticflickr.com/65535/48748117893_eb232faa93_o.jpg
119	137	Ex SIDAUTO/SPARCO	Settimo Torinese	Km. 0.500, Autostrada Torino-Milano	https://live.staticflickr.com/65535/48748636172_b5025b0030_o.jpg
156	157	Ex TEKSID - Area Ir1	Buttigliera Alta	Corso Susa, 4 (Ferriera)	https://live.staticflickr.com/65535/48748635907_503cf104e8_o.jpg
115	129	Area industriale dismessa	Piobesi Torinese	Corso Italia 57	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
138	127	Area DM1053	Torrazza Piemonte	Via Cappello 29	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
6	13	Ex Chimica Industriale, Progetto PTI Parco Sangone	Rivalta di Torino	Via Piossasco	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
65	3	New Cocot	Perosa Argentina	Via Re Umberto	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
7	14	Ex Oma. Progetto PTI Parco Sangone	Rivalta di Torino	Via Papini	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
75	36	Ex Metal Chimica, proprietÓ comunale	Caselle Torinese	Via Amedeo di Castellamonte	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
140	133	Industrial area - Viberti	Nichelino	Viale Giacomo Matteotti	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
142	141	Ex Novelis Italia	Borgofranco d'Ivrea	Via Grange	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
20	148	AERFERRISI ownership	Settimo Torinese	Via Cebrosa 5	https://live.staticflickr.com/65535/48748636077_be858cffa3_o.jpg
63	1	Ex-macello	Candiolo	s.p. 142	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
15	49	Ex PINIFARINA	San Giorgio Canavese	Strada Provinciale 53	https://live.staticflickr.com/65535/48748453521_dfcafbe3a7_o.jpg
73	34	Ex Ecolinea	Leini	Via Torino	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
79	48	Ex Benevenuta	Rivara	Via Busano	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
82	53	Industrial area	Forno Canavese	Via Truchetti	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
68	22	Ex FGR Fonderie Ghisa Rosta	Rosta	Via Sant'Antonio di Ranverso	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
121	17	Industrial area	Coazze	Via Sartorio	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
124	38	Industrial area	Cirie	Localita Borche	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
91	77	Ex officine canavesane (ocsa-degra)	Favria	Via Antonio Costantino	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
127	42	EX Lanificio Remmert	Cirie	Via F.lli Remmert, 77	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
64	2	Ex Sipav di Gioda	Vinovo	Via Vinovo	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
51	26	Industrial area Cebrosa - Ex Lucchini (Mf17)	Settimo Torinese	Via Leini 122	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
54	32	Industrial area - Ex Ceat Pirelli (Mf22)	Settimo Torinese	Via Brescia	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png
47	9	area MART	Rivalta di Torino	Via Primo Maggio	https://live.staticflickr.com/65535/49199554202_5c4a466c0d_o.png

Fig.65 Abandoned brownfield areas in metropolitan area of Turin included in TRENTAMETRO project

Fig.65 Abandoned brownfield areas in metropolitan area of Turin included in TRENTAMETRO project

uso_1	stato_co_1	typology_1	fonte_1	last_upd_1	zoneomog_1	sf_1	sc_1	fondiaria	copertura
Produttivo	a - Greenfield	Industrial areas	CEIP Piemonte - Promoter agency	2019	AM Sud	17386	8693	b) 10000 - 30000	a) 5000 - 10000
Produttivo	a - Greenfield	Industrial areas	Sviluppo Investimenti Territorio	2019	AM Sud	60000	0	d) oltre 50000	e) n.a.
Produttivo	a - Greenfield	Industrial areas	CEIP Piemonte - Promoter agency	2016	AM Ovest	31750	0	c) 30000 - 50000	e) n.a.
Produttivo	a - Greenfield	Industrial areas	Municipality	2018	AM Nord	125400	0	d) oltre 50000	e) n.a.
Produttivo	a - Greenfield	Industrial areas	CEIP Piemonte - Promoter agency	2019	Chierese - Carmagnolese	11200	5944	b) 10000 - 30000	a) 5000 - 10000
Produttivo	a - Greenfield	Industrial areas	CEIP Piemonte - Promoter agency	2016	AM Nord	275400	0	d) oltre 50000	e) n.a.
Produttivo	a - Greenfield	Industrial areas	CEIP Piemonte - Promoter agency	2016	AM Nord	29500	0	b) 10000 - 30000	e) n.a.
Produttivo	a - Greenfield	Industrial areas	Municipality	2018	AM Nord	60150	0	d) oltre 50000	e) n.a.
Produttivo	a - Greenfield	Industrial areas	CEIP Piemonte - Promoter agency	2016	AM Ovest	64000	0	d) oltre 50000	e) n.a.
Produttivo	a - Greenfield	Industrial areas	Municipality	2019	Chierese - Carmagnolese	140000	70000	d) oltre 50000	d) oltre 30000
Produttivo	a - Greenfield	Industrial areas	PTC - Territorial Masterplan	2008	Canavese Occidentale	20810	0	b) 10000 - 30000	e) n.a.
Produttivo	a - Greenfield	Industrial areas	Municipality	2019	AM Sud	26550	15907	b) 10000 - 30000	b) 10000 - 20000
Produttivo	a - Greenfield	Industrial areas	Municipality	2018	Chivassese	30987	15493	c) 30000 - 50000	b) 10000 - 20000
Produttivo	a - Greenfield	Industrial areas	Confindustria Piemonte	2019	AM Nord	60000	0	d) oltre 50000	e) n.a.
Produttivo	a - Greenfield	Industrial areas	Confindustria Piemonte	2019	AM Nord	15000	6000	b) 10000 - 30000	a) 5000 - 10000
Produttivo	a - Greenfield	Industrial areas	Confindustria Piemonte	2019	AM Nord	15000	10000	b) 10000 - 30000	b) 10000 - 20000
Produttivo	a - Greenfield	Industrial areas	Confindustria Piemonte	2019	Chivassese	93200	46600	d) oltre 50000	d) oltre 30000
Produttivo	a - Greenfield	Industrial areas	Confindustria Piemonte	2019	Chivassese	48000	24000	c) 30000 - 50000	c) 20000 - 30000
Produttivo	a - Greenfield	Industrial areas	n.a.	2019	n.a.	138000	0	d) oltre 50000	e) n.a.
Produttivo	a - Greenfield	Industrial areas	Sviluppo Investimenti Territorio	2018	Eporediese	9770	0	a) 5000 - 10000	e) n.a.
Produttivo	b- New construction	Industrial areas	CEIP Piemonte - Promoter agency	2017	AM Nord	10000	5000	a) 5000 - 10000	a) 5000 - 10000
Produttivo	c- Good	Industrial areas	PTC - Territorial Masterplan	2008	AM Sud	35405	21071	c) 30000 - 50000	c) 20000 - 30000
Produttivo	c- Good	Industrial sheds	Real estate market	2018	Pinerolese	0	5300	e) n.a.	a) 5000 - 10000
Produttivo	c- Good	Industrial areas	Confindustria Piemonte	2019	AM Nord	54700	12120	d) oltre 50000	b) 10000 - 20000
Produttivo	c- Good	Industrial areas	CEIP Piemonte - Promoter agency	2016	AM Sud	161873	90000	d) oltre 50000	d) oltre 30000
Produttivo	c- Good	Industrial areas	PTC - Territorial Masterplan	2008	Canavese Occidentale	33418	7887	c) 30000 - 50000	a) 5000 - 10000
Produttivo	c- Good	Industrial areas	Sviluppo Investimenti Territorio	2019	Chierese - Carmagnolese	0	26000	e) n.a.	c) 20000 - 30000
Produttivo	c- Good	Industrial areas	PTC - Territorial Masterplan	2008	Canavese Occidentale	21000	15797	b) 10000 - 30000	b) 10000 - 20000
Produttivo	c- Good	Industrial areas	Municipality	2018	Chierese - Carmagnolese	25000	8500	b) 10000 - 30000	a) 5000 - 10000
Produttivo	c- Good	Industrial sheds	Real estate market	2018	Chierese - Carmagnolese	0	9959	e) n.a.	a) 5000 - 10000
Produttivo	c- Good	Industrial sheds	Real estate market	2018	AM Ovest	0	15918	e) n.a.	b) 10000 - 20000
Produttivo	c- Good	Industrial sheds	Real estate market	2018	AM Nord	0	5400	e) n.a.	a) 5000 - 10000
Produttivo	c- Good	Industrial sheds	Real estate market	2019	Eporediese	19245	10200	b) 10000 - 30000	b) 10000 - 20000
Produttivo	c- Good	Industrial sheds	Real estate market	2018	AM Nord	0	6565	e) n.a.	a) 5000 - 10000
Produttivo	c- Good	Industrial sheds	Real estate market	2018	Chivassese	0	7927	e) n.a.	a) 5000 - 10000
Produttivo	c- Good	Industrial sheds	Real estate market	2018	AM Nord	0	5455	e) n.a.	a) 5000 - 10000
Produttivo	c- Good	Industrial areas	CEIP Piemonte - Promoter agency	2018	Eporediese	766000	195200	d) oltre 50000	d) oltre 30000
Produttivo	c- Good	Industrial sheds	Real estate market	2018	AM Sud	0	8911	e) n.a.	a) 5000 - 10000
Produttivo	c- Good	Industrial sheds	Real estate market	2018	AM Ovest	0	6127	e) n.a.	a) 5000 - 10000
Produttivo	c- Good	Industrial areas	PTC - Territorial Masterplan	2008	Chivassese	60178	31000	d) oltre 50000	d) oltre 30000
Produttivo	c- Good	Industrial areas	PTC - Territorial Masterplan	2008	Canavese Occidentale	20083	12000	b) 10000 - 30000	b) 10000 - 20000
Produttivo	c- Good	Industrial sheds	Real estate market	2018	AM Nord	0	6361	e) n.a.	a) 5000 - 10000
Produttivo	c- Good	Industrial sheds	Real estate market	2018	AM Sud	0	6000	e) n.a.	a) 5000 - 10000
Produttivo	c- Good	Industrial sheds	Real estate market	2018	AM Sud	0	7200	e) n.a.	a) 5000 - 10000
Produttivo	c- Good	Industrial sheds	Real estate market	2018	AM Ovest	0	18300	e) n.a.	b) 10000 - 20000
Produttivo	c- Good	Industrial sheds	Real estate market	2018	AM Ovest	0	6000	e) n.a.	a) 5000 - 10000
Produttivo	c- Good	Industrial sheds	Real estate market	2018	AM Ovest	0	6500	e) n.a.	a) 5000 - 10000
Produttivo	c- Good	Industrial sheds	Real estate market	2018	AM Ovest	0	8950	e) n.a.	a) 5000 - 10000
Produttivo	c- Good	Industrial sheds	Real estate market	2018	AM Ovest	0	22000	e) n.a.	c) 20000 - 30000
Produttivo	c- Good	Industrial sheds	Real estate market	2018	AM Nord	0	5500	e) n.a.	a) 5000 - 10000
Produttivo	c- Good	Industrial sheds	Real estate market	2018	Chierese - Carmagnolese	0	32209	e) n.a.	d) oltre 30000
Produttivo	c- Good	Industrial areas	CEIP Piemonte - Promoter agency	2018	Canavese Occidentale	62000	18700	d) oltre 50000	b) 10000 - 20000
Produttivo	c- Good	Industrial areas	PTC - Territorial Masterplan	2018	Canavese Occidentale	15499	7565	b) 10000 - 30000	a) 5000 - 10000
Produttivo	c- Good	Industrial areas	PTC - Territorial Masterplan	2008	Canavese Occidentale	22000	6050	b) 10000 - 30000	a) 5000 - 10000
Produttivo	c- Good	Industrial sheds	Real estate market	2018	Chierese - Carmagnolese	0	5000	e) n.a.	a) 5000 - 10000
Produttivo	c- Good	Industrial sheds	Real estate market	2018	Eporediese	0	9600	e) n.a.	a) 5000 - 10000
Produttivo	c- Good	Industrial sheds	Real estate market	2018	AM Sud	0	10500	e) n.a.	b) 10000 - 20000
Produttivo	c- Good	Industrial sheds	Real estate market	2018	Eporediese	0	6250	e) n.a.	a) 5000 - 10000
Produttivo	c- Good	Industrial sheds	Real estate market	2018	Chivassese	0	5186	e) n.a.	a) 5000 - 10000
Produttivo	c- Good	Industrial sheds	Real estate market	2018	AM Nord	0	7700	e) n.a.	a) 5000 - 10000
Produttivo	c- Good	Industrial areas	PTC - Territorial Masterplan	2008	AM Ovest	52262	26000	d) oltre 50000	c) 20000 - 30000
Produttivo	c- Good	Industrial sheds	PTC - Territorial Masterplan	2018	AM Nord	44942	15000	c) 30000 - 50000	b) 10000 - 20000
Produttivo	c- Good	Industrial sheds	Real estate market	2018	AM Nord	0	7700	e) n.a.	a) 5000 - 10000
Produttivo	c- Good	Industrial sheds	Real estate market	2018	AM Nord	0	5000	e) n.a.	a) 5000 - 10000
Produttivo	c- Good	Industrial sheds	Real estate market	2018	AM Sud	0	12330	e) n.a.	b) 10000 - 20000
Produttivo	c- Good	Industrial sheds	Real estate market	2018	AM Sud	0	5200	e) n.a.	a) 5000 - 10000
Produttivo	c- Good	Industrial sheds	Real estate market	2018	Canavese Occidentale	0	5300	e) n.a.	a) 5000 - 10000
Produttivo	c- Good	Industrial areas	Municipality	2018	AM Ovest	17334	12600	b) 10000 - 30000	b) 10000 - 20000
Produttivo	c- Good	Industrial sheds	Real estate market	2018	Valli di Susa e Sangone	0	13500	e) n.a.	b) 10000 - 20000
Produttivo	c- Good	Industrial areas	Municipality	2018	Chivassese	95875	47937	d) oltre 50000	d) oltre 30000
Produttivo	c- Good	Industrial sheds	Real estate market	2018	AM Sud	0	6000	e) n.a.	a) 5000 - 10000
Produttivo	c- Good	Industrial areas	PTC - Territorial Masterplan	2008	AM Sud	6701	5715	a) 5000 - 10000	a) 5000 - 10000
Produttivo	c- Good	Industrial areas	CEIP Piemonte - Promoter agency	2019	Chivassese	55000	25000	d) oltre 50000	c) 20000 - 30000
Produttivo	c- Good	Industrial sheds	Real estate market	2018	AM Sud	0	15100	e) n.a.	b) 10000 - 20000
Produttivo	c- Good	Industrial sheds	Real estate market	2018	Pinerolese	0	7700	e) n.a.	a) 5000 - 10000
Produttivo	c- Good	Industrial sheds	Real estate market	2018	Valli di Susa e Sangone	0	14684	e) n.a.	b) 10000 - 20000
Produttivo	c- Good	Industrial sheds	Real estate market	2018	Chierese - Carmagnolese	0	5925	e) n.a.	a) 5000 - 10000
Produttivo	c- Good	Industrial sheds	Real estate market	2018	AM Nord	0	18000	e) n.a.	b) 10000 - 20000
Produttivo	c- Good	Industrial sheds	Real estate market	2018	AM Ovest	0	5430	e) n.a.	a) 5000 - 10000
Produttivo	c- Good	Industrial sheds	Real estate market	2018	AM Sud	0	38000	e) n.a.	d) oltre 30000
Produttivo	c- Good	Industrial sheds	Real estate market	2018	AM Sud	0	27000	e) n.a.	c) 20000 - 30000
Produttivo	c- Good	Industrial areas	PTC - Territorial Masterplan	2008	Canavese Occidentale	11601	5561	b) 10000 - 30000	a) 5000 - 10000
Produttivo	c- Good	Industrial areas	Other	2019	Eporediese	0	5000	e) n.a.	a) 5000 - 10000
Produttivo	c- Good	Industrial sheds	Real estate market	2018	AM Sud	0	11300	e) n.a.	b) 10000 - 20000
Produttivo	c- Good	Industrial sheds	Real estate market	2018	AM Sud	0	6000	e) n.a.	a) 5000 - 10000
Produttivo	c- Good	Industrial areas	PTC - Territorial Masterplan	2008	AM Nord	26535	12000	b) 10000 - 30000	b) 10000 - 20000
Produttivo	c- Good	Industrial sheds	Real estate market	2018	Pinerolese	0	5510	e) n.a.	a) 5000 - 10000
Produttivo	c- Good	Industrial areas	CEIP Piemonte - Promoter agency	2018	AM Sud	8000	5060	a) 5000 - 10000	a) 5000 - 10000
Produttivo	c- Good	Industrial sheds	Real estate market	2018	AM Nord	0	24000	e) n.a.	c) 20000 - 30000
Produttivo	c- Good	Industrial areas	Municipality	2018	Eporediese	0	23040	e) n.a.	c) 20000 - 30000
Produttivo	c- Good	Industrial areas	Municipality	2018	Chivassese	15681	9804	b) 10000 - 30000	a) 5000 - 10000
Produttivo	c- Good	Industrial areas	Municipality	2018	Chierese - Carmagnolese	30780	16395	c) 30000 - 50000	b) 10000 - 20000
Produttivo	c- Good	Industrial areas	Municipality	2019	Chivassese	55000	10000	d) oltre 50000	b) 10000 - 20000
Produttivo	d - Medium	Industrial areas	PTC - Territorial Masterplan	2008	Ciriacese e Valli di Lanzo	88953	35356	d) oltre 50000	d) oltre 30000
Produttivo	d - Medium	Industrial areas	PTC - Territorial Masterplan	2019	Canavese Occidentale	57800	25000	d) oltre 50000	c) 20000 - 30000
Produttivo	d - Medium	Industrial areas	PTC - Territorial Masterplan	2008	AM Sud	30839	0	c) 30000 - 50000	e) n.a.
Produttivo	d - Medium	Industrial areas	PTC - Territorial Masterplan	2008	Canavese Occidentale	20000	8681	b) 10000 - 30000	a) 5000 - 10000
Produttivo	d - Medium	Industrial areas	Other	2018	Ciriacese e Valli di Lanzo	9000	5000	a) 5000 - 10000	a) 5000 - 10000
Produttivo	d - Medium	Industrial areas	Municipality	2019	AM Nord	25000	0	b) 10000 - 30000	e) n.a.
Produttivo	d - Medium	Industrial areas	Other	2019	AM Nord	58382	6216	d) oltre 50000	a) 5000 - 10000
Produttivo	d - Medium	Industrial sheds	Real estate market	2019	AM Sud	63961	22631	d) oltre 50000	c) 20000 - 30000
Produttivo	d - Medium	Industrial sheds	Real estate market	2019	Canavese Occidentale	20947	5000	b) 10000 - 30000	a) 5000 - 10000
Produttivo	d - Medium	Industrial areas	PTC - Territorial Masterplan	2008	AM Ovest	11419	7426	b) 10000 - 30000	a) 5000 - 10000
Produttivo	d - Medium	Industrial areas	PTC - Territorial Masterplan	2008	AM Ovest	57263	0	d) oltre 50000	e) n.a.
Produttivo	d - Medium	Industrial areas	Real estate market	2019	AM Sud	277000	85045	d) oltre 50000	d) oltre 30000
Produttivo	d - Medium	Industrial areas	PTC - Territorial Masterplan	2008	Canavese Occidentale	40408	23466	c) 30000 - 50000	c) 20000 - 30000
Produttivo	d - Medium	Industrial areas	Municipality	2018	Eporediese	0	13485	e) n.a.	b) 10000 - 20000
Produttivo	d - Medium	Industrial areas	Municipality	2019	Chierese - Carmagnolese	12892	5000	b) 10000 - 30000	a) 5000 - 10000
Produttivo	d - Medium	Industrial areas	Municipality	2019	AM Nord	276517	0	d) oltre 50000	e) n.a.
Produttivo	d - Medium	Industrial areas	Other	2018	Ciriacese e Valli di Lanzo	19035	16600	b) 10000 - 30000	b) 10000 - 20000
Produttivo	d - Medium	Industrial areas	Municipality	2018	AM Nord	111973	11701	d) oltre 50000	b) 10000 - 20000
Produttivo	d - Medium	Industrial areas	Confindustria Piemonte	2019	Chivassese	57094	30000	d) oltre 50000	d) oltre 30000
Produttivo	d - Medium	Industrial areas	Municipality	2019	AM Nord	48684	10403	c) 30000 - 50000	b) 10000 - 20000
Produttivo	d - Medium	Industrial areas	Municipality	2019	AM Ovest	28000	17800	b) 10000 - 30000	b) 10000 - 20000
Produttivo	d - Medium	Industrial areas	Municipality	2018	AM Sud	47315	19782	c) 30000 - 50000	b) 10000 - 20000
Produttivo	d - Medium	Industrial areas	Municipality	2018	Chivassese	33649	16825	c) 30000 - 50000	b) 10000 - 20000
Produttivo	e - Poor	Industrial areas	PTC - Territorial Masterplan	2008	AM Sud	39233	0	c) 30000 - 50000	e) n.a.
Produttivo	e - Poor	Industrial areas	PTC - Territorial Masterplan	2008	Pinerolese	100920	25900	d) oltre 50000	c) 20000 - 30000
Produttivo	e - Poor	Industrial areas	PTC - Territorial Masterplan	2008	AM Sud	18401	0	b) 10000 - 30000	e) n.a.
Produttivo	e - Poor	Industrial areas	PTC - Territorial Masterplan	2008	AM Nord	12519	5000	b) 10000 - 30000	a) 5000 - 10000
Produttivo	e - Poor	Industrial areas	Municipality	2018	AM Nord	232000	65209	d) oltre 50000	d) oltre 30000
Produttivo	e - Poor	Industrial areas	Municipality	2019	Eporediese	394323	0	d) oltre 50000	e) n.a.
Produttivo	e - Poor	Industrial sheds	Confindustria Piemonte	2019	AM Nord	17000	5570	b) 10000 - 30000	a) 5000 - 10000
Produttivo	e - Poor	Industrial areas	PTC - Territorial Masterplan	2008	AM Sud	123047	17125	d) oltre 50000	b) 10000 - 20000
Produttivo	e - Poor	Industrial areas	Municipality	2019	Canavese Occidentale	196000	37876	d) oltre 50000	d) oltre 30000
Produttivo	e - Poor	Industrial areas	PTC - Territorial Masterplan	2008	AM Nord	41842	0	c) 30000 - 50000	e) n.a.
Produttivo	e - Poor	Industrial areas	PTC - Territorial Masterplan	2008	Canavese Occidentale	11598	5000	b) 10000 - 30000	a) 5000 - 10000
Produttivo	e - Poor	Industrial areas	PTC - Territorial Masterplan	2008	Canavese Occidentale	26429	6908	b) 10000 - 30000	a) 5000 - 10000
Produttivo	e - Poor	Industrial areas	PTC - Territorial Masterplan	2008	AM Ovest	63448	6511	d) oltre 50000	a) 5000 - 10000
Produttivo	e - Poor	Industrial areas	PTC - Territorial Masterplan	2008	Valli di Susa e Sangone	117158	28000	d) oltre 50000	c) 20000 - 30000
Produttivo	e - Poor	Industrial areas	PTC - Territorial Masterplan	2008	Ciriacese e Valli di Lanzo	14086	10000	b) 10000 - 30000	a) 5000 - 10000
Produttivo	e - Poor	Industrial areas	Municipality	2018	Canavese Occidentale	11788	5894	b) 10000 - 30000	a) 5000 - 10000
Produttivo	e - Poor	Industrial areas	Other	2018	Ciriacese e Valli di Lanzo	7000	5200	a) 5000 - 10000	a) 5000 - 10000
Produttivo	f- Bad	Industrial areas	PTC - Territorial Masterplan	2008	AM Sud	88410	23384	d) oltre 50000	c) 20000 - 30000
Produttivo	f- Bad	Industrial areas	CEIP Piemonte - Promoter agency	2016	AM Nord	93770	46885	d) oltre 50000	d) oltre 30000
Produttivo	f- Bad	Industrial areas	CEIP Piemonte - Promoter agency	2016	AM Nord	374000	130900	d) oltre 50000	d) oltre 30000
Produttivo	f- Bad	Industrial areas	PTC - Territorial Masterplan	2008	AM Sud	103625	0	d) oltre 50000	e) n.a.

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None		Not included	https://drive.google.com/file/d/1XtQuOMKq02q46uagZjRhcMdolxDLSCbq/view?usp=sharing
None		Not included	https://drive.google.com/file/d/1XtQuOMKq02q46uagZjRhcMdolxDLSCbq/view?usp=sharing
Individual contexts		Not included	https://drive.google.com/file/d/1XtQuOMKq02q46uagZjRhcMdolxDLSCbq/view?usp=sharing
Individual contexts		Not included	https://drive.google.com/file/d/1XtQuOMKq02q46uagZjRhcMdolxDLSCbq/view?usp=sharing
None		Not included	https://drive.google.com/file/d/1XtQuOMKq02q46uagZjRhcMdolxDLSCbq/view?usp=sharing
PTCP Strategic areas	no longer available	Not included	https://drive.google.com/file/d/1XtQuOMKq02q46uagZjRhcMdolxDLSCbq/view?usp=sharing
PTCP Strategic areas	no longer available	Not included	https://drive.google.com/file/d/1XtQuOMKq02q46uagZjRhcMdolxDLSCbq/view?usp=sharing
PTCP Strategic areas		Not included	https://drive.google.com/file/d/1XtQuOMKq02q46uagZjRhcMdolxDLSCbq/view?usp=sharing

Fig.65 Abandoned brownfield areas in metropolitan area of Turin included in TRENTAMETRO project - Table extracted from the platform - http://www.urbantool-box.it/project/trentametro/ Source: Architect Paola Boggio Merlo - Città metropolitana di Torino