GreenFORCE

Torino Summer School

Final report of team 5

Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or European Research Executive Agency (REA). Neither the European Union nor the granting authority can be held responsible for them.

Horizon Europe Programme
HORIZON-WIDERA-2021-ACCESS-02-01
Twinning Western Balkans

Authors

AMINRAD Ramtin, Territorial, Environmental, Urban and Landscape Planning, Politecnico di Torino, ramtinradrad@gmail.com
AY Cemre Betül, Territorial, Environmental, Urban and Landscape Planning, Politecnico di Torino, iamcemreay@gmail.com
KALO Irisa, Urban Planning and Management, Polis University, irisa_kalo@universitetipolis.edu.al
MILOŠEVIĆ Branko, Faculty of Geography, University of Belgrade, banemilosevic1998@gmail.com
NIKOLOV Ana, Faculty of Geography, University of Belgrade, ananikolov@gmail.com

URBAN GREEN REGENERATION
Urban regeneration and sustainable mobility

Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or European Research Executive Agency (EREA). Neither the European Union nor the granting authority can be held responsible for them.

Contents

Authors 1

1 ABSTRACT (max. 200 words) 3

2 THEORETICAL AND METHODOLOGICAL FRAMEWORK 3

2.1 Aim of the report *(max. 200 words)* 3
2.2 Literature review on Just Green Transitions *(max. 500 words)* 3
2.3 Mapping Turin's Strategic Development Priorities *(max 500 words)* 4
2.4 Methods *(max. 500 words)* 4

3 CASE STUDY ANALYSIS 6

3.1 Thematic Study Selection *(max 500 words)* 6
3.2 Spatialisation of Just Green Transition Impacts *(max. 750 words)* 7
3.3 Cost-Benefit Analyses to measure Just Green Transitions *(max. 750 words)* 8
3.4 Land-Based financing for Climate Solutions *(max. 750 words)* 9
3.5 Just Green Transition: between carbon-neutrality and re-industrialisation *(max. 750 words)* 9

4 POLICY ADVICE AND RECOMMENDATIONS 10

5 REFERENCES 10

Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or European Research Executive Agency (EREA). Neither the European Union nor the granting authority can be held responsible for them.

1 ABSTRACT

The aim of this study is to contribute to the development of Turin's Just Green Transition in the framework of public consultation and involvement in the process. It represents the vision of the students from Albanian(Polis University- Faculty of Urban Planning and Management), Serbian(University of Belgrade-Faculty of Geography) and Italian (Politecnico di Torino) Institutions, developed in the framework of Green Force project. Its findings are results of the lectures and workshops at the summer school extended by policy and strategy review, GIS data analysis, swot and pestle analysis, impact and cost benefit analysis, and synthesis. The whole project is built on suggesting a physical and social transition on the spatial dimension by supporting urban regeneration which is blended with green strategies to make Torino more climate-resilient and sustainable city. The synthesis resulted in policy recommendation targeting green urban regeneration with three following pillars greenery network, urban renovation, and social sustainability, and sustainable mobility along with one horizontal line: inclusion and just transition for the vulnerable classes with the suggested policy changes.

2 THEORETICAL AND METHODOLOGICAL FRAMEWORK

Turin, is a city having natural, historical, and cultural beauties that come from its history always being an important location for every civilization, Kingdom, Empire, and Republic that has been established in the Piedmont Region. Along with the history, all the phases have left their marks on the city while putting some challenges for the future. Currently, Turin is a city that is known for its history, architectural heritage, natural beauty, and numerous cultural heritages that have been inherited from earlier times. Furthermore, Turin has been known as the industrial center in Italy with numerous production facilities that are from different sectors since the late 19th Century. Regarding this rapid industrialization, the population of Torino also increased abruptly in the following years by appealing to the workforce from Southern Italy, and this unexpected migration forced the City to build new houses in mid-20th century to provide shelter for all newcomers, most of whom were concentrated around industrial facilities. After the golden period of development with high population, the city began to shrink due to the deindustrialization trend in the European countries, and since then, Turin has been in the transition process from being an industrial metropolis to a more social, active, and environmental city. The first transition was to become an appealing city for tourists and students; but, in response to the effects of climate change, policies began to shift toward being the greenest and most climate-resilient city. In the end, all these transition phases came with benefits and drawbacks, and the main aim of this report is to propose a new way to facilitate the transition phase to become a climate-resilient city while promoting just green transition policies.

2.1 Aim of the project

As a city that has experienced shrinkage in its history, Turin strives to overcome numerous problems related with social dynamics in the city, and built and natural environment. The main problems Turin has been dealing with can be listed as uneven urban development, social stratification and urban segregation, and accelerating climate change impacts and urban heat island effects. Our objective is to analyze the current city's structure in

Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or European Research Executive Agency (EREA). Neither the European Union nor the granting authority can be held responsible for them.

an innovative manner, incorporating natural elements and societal considerations to promote a climate-resilient intervention. This intervention seeks to bridge the gap between the southern and northern parts of the city with using implementations of green initiatives while enhancing the life quality in the city, leveraging its industrial history to create a more sustainable and interconnected urban environment. Aiming to be compatible with the current strategies of Turin Municipality, the main aims and proposals are made in harmony with Turin's urban development agenda.

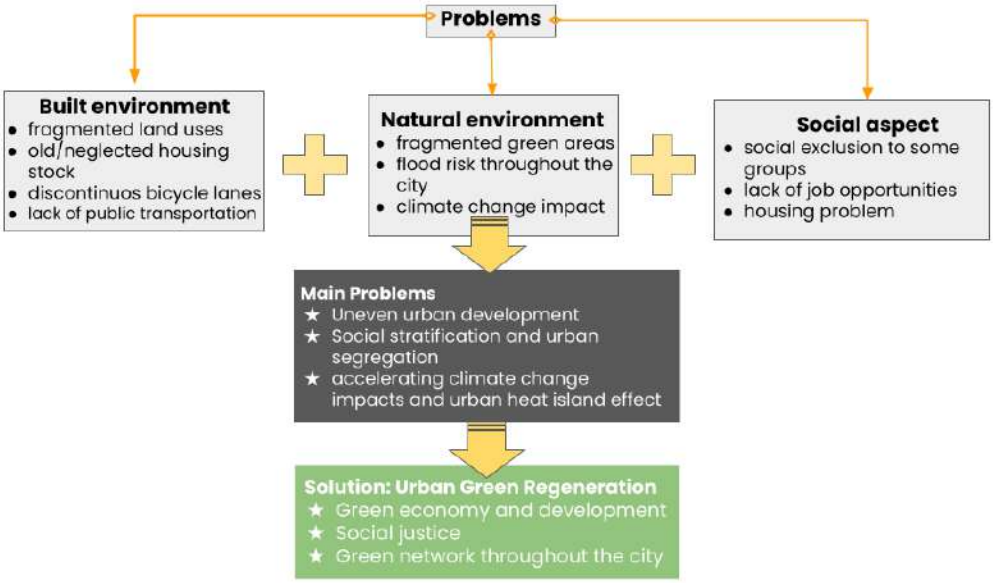


Figure 1. Mind map to explain the mindset behind the aim of the project

2.2 Literature review on Just Green Transitions *(max. 500 words)*

The European Green Deal 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 gases 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. It must put people first, and pay attention to the regions, industries and workers who will face the greatest challenges.'* (European Commission, 2019).

'*European Green Deal offers the opportunity to promote synergies between the Territorial Agenda and overarching EU strategies and policies. It is in line with the idea of territorial cohesion and the place-based approach, building on the diverse potential of all places and improving the overall territorial balance in Europe. The Territorial Agenda and the New Leipzig Charter share the place-based approach, policy coordination and effective multi-level policy frameworks as common principles. The Territorial*

Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or European Research Executive Agency (EREA). Neither the European Union nor the granting authority can be held responsible for them.

Agenda advocates these as overarching principles for all places and policy sectors. The New Leipzig Charter provides guidance for applying these in cities, urban areas, their functional regions and peri-urban areas. As set out in the New Leipzig Charter, the principles of good urban governance and quality design ensure attractive, inclusive, durable, adaptable places which help make them more pleasant and attractive for people to work, live and enjoy. It is essential that public authorities proactively plan for high quality and inclusive design when considering development in our cities, towns and villages. Building bridges between people with different incomes, educational backgrounds, cultures, traditions, and religions is key to keeping Europe together. We shall facilitate cooperation and increase solidarity between civil society to reduce segregation, promote social inclusion, and use diversity as an asset for everyone's well-being.'(EU, 2020).

Territorial priorities for Europe are defined by two overarching objectives: a Just Europe and a Green Europe. **A Just Europe that offers future perspectives for all places and people** via better-balanced territorial development, Convergent local and regional development, less inequality between places, and Easier living and working across national borders. **A Green Europe that protects common livelihoods and shapes societal transition** via **b**etter ecological livelihoods, climate-neutral and resilient towns, cities and regions, Strong and sustainable local economies, and Sustainable digital and physical connectivity of places. (EU, 2021)

2.3 Mapping Turin's Strategic Development Priorities *(max 500 words)*

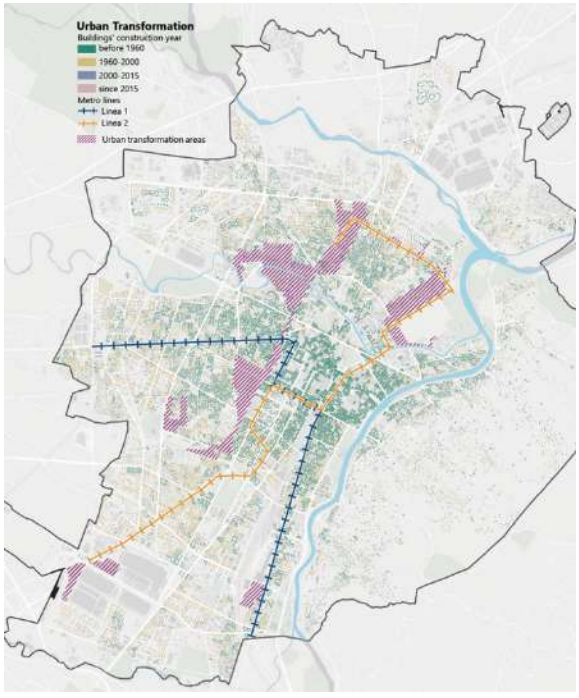


Figure 2. Urban transformation zones and buildings' constructions years

Over the course of its history, Turin has experienced many changes, but the city's development has always been a priority in policy-making. Since 2018, Turin Municipality has been working on a new Master Plan for the city to direct urban development, and although the plan hasn't been released yet, the primary concerns have been identified, and the development of northern and peripheral parts of Turin is among the priorities due to their history of development dating back to Turin's industrial era.

In order to overcome urban segregation in the city, there are big-scale projects planned in these parts of the city with focusing on a creating a new metro line and urban transformation projects focusing on renewal and refunction of old and neglected building stock (Figure 2) (Spenelli, 2023).

Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or European Research Executive Agency (EREA). Neither the European Union nor the granting authority can be held responsible for them.

Apart from these large-scale projects, the Municipality of Turin has published a number of strategies to adapt and mitigate climate change impacts. Climate Resilience Plan(2019), Strategic Green Infrastructure Plan (2020) and Sustainable Urban Mobility Plan(updated annually) are the milestones to be environmental-friendly city. In all these documents, the problems that put heavy emphasis on are flooding risk in different parts of the city, and urban heat islands that have been an important risk for the whole city, especially around the old and existing industrial areas(Turin Municipality, 2019). In order to cope with these problems, the Turin Metropolitan Strategy Plan is concerned on *green revolution and ecological transition* by enhancing the policies to increase green areas, reuse of abandoned buildings, promoting renewable energy usage in the buildings, and promoting circular economy principles in the city (Citta Metropolitana di Torino, 2019a).

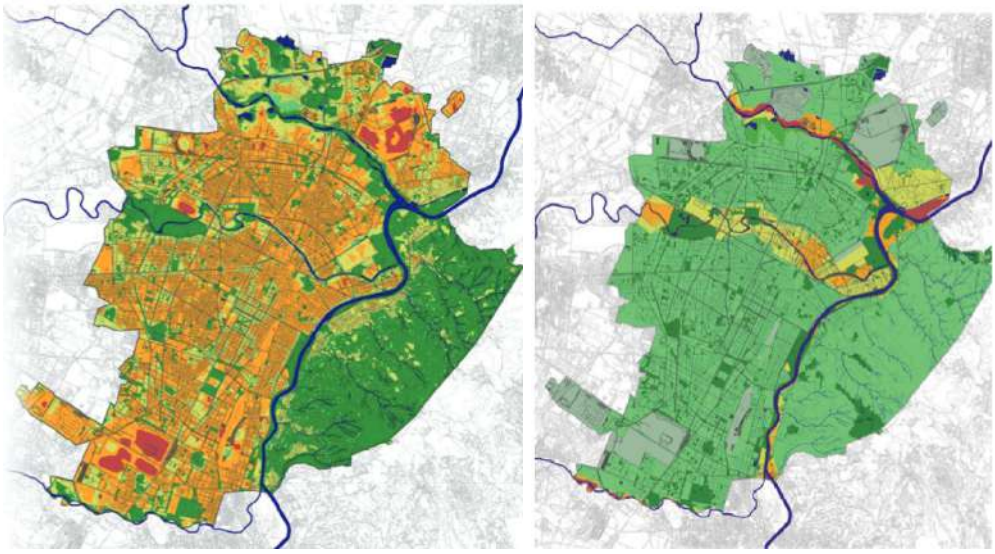


Figure 3 and 4. Urban heat islands (on the right) and flood risk areas (on the left) (Turin Municipality, 2019;2020).

All these policy frameworks aims to decrease the CO_2 emission level in the city to mitigate and adaptate climate change impacts by implementing policy and act changes on the local scale;

- Replacement of windows, doors and installation of insulation around the buildings,
- Implementing nature-based solutions throughout the city,
- Decreasing impermeability rate by altering irreversible land consumption,
- Promoting sustainable urban mobility by extending public transportation network throughout the city, and enhancing bicycle roads (Turin Municipality, 2019;2020).

Torino Municipality has prepared the yearly Sustainable Mobility Urban Plan since 2008, and accessibility has been the most pivotal subject in order to provide all the services at easily accessible distances for all citizens. And in terms of transportation, the promotion of rail networks, and motivating people to use public transport or walk/cycle in the city are the fundamental policies to

Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or European Research Executive Agency (EREA). Neither the European Union nor the granting authority can be held responsible for them.

realize sustainable urban mobility. Aiming to provide sustainable transportation in the city, the strategies that have been determined by the Torino Municipality are designing multimodal services for the users, integrating the public transportation network from regional scale to local scale, and creating 15' 15-minute city by redesigning the urban layout (Citta Metropolitana di Torino, 2019b). Regarding all of these policy changes, Turin has been selected as one of the 100 Climate Neutral Cities in the European continent, and 5 main strategic focuses are listed in the following:

- Promoting energy efficiency and usage of renewable sources in the buildings and public areas for lightning,
- Decreasing CO_2 emission in the transportation by relying on sustainable mobility principles,
- Implementation of Smart City principles by monitoring and data collection,
- Integrating circular economy principles into the agenda by considering regional and local production chains,
- Redesigining the city by considering accessibility, livability, and sustainability of the communities(Deambragio, 2023).

2.4 Methods

The methodology is based on 3 crucial principles of research:

1. **Gathering the data**
2. **Spatial & theoretical analysis**
3. **Synthesis**

These principles will be materialised through six precisely defined methods which are based on data gathered through the research of the relevant documents.

1. **Analyzing the current conditions based on a historical overview** is a systematic approach employed across various domains to gain insights, make informed decisions, and plan for the future. This method involves the examination of past events, trends, and data in conjunction with the assessment of the present situation. This method will allow us to contextualize contemporary issues and make connections between historical events and current challenges.

2. **Detecting the focus Area/s** is a fundamental step in defining focus areas of the city for urban planning purposes and disaster management. It involves the identification and delineation of specific geographic regions or zones for further analysis or intervention. In urban planning, the detection of areas plays a crucial role in land-use planning and infrastructure development. By using geographic information systems (GIS) to map out existing land uses, zoning regulations, and population density and analyze this spatial data, urban planners can identify areas with potential for growth, redevelopment, or conservation.

Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or European Research Executive Agency (EREA). Neither the European Union nor the granting authority can be held responsible for them.

3. **Defining Ideas, Objectives, and Impacts** is a critical step in the planning and execution of the project of Urban green regeneration of the City of Turin. It involves envisioning the future state of a project, setting clear objectives, and assessing the potential outcomes and consequences. Projecting ideas for green urban redevelopment/regeneration is a complex process, so factors such as urban density, transportation systems, and environmental sustainability will be considered in the process of decision-making.

4. **Locating the Problem** is a foundational step in problem-solving and decision-making processes. It involves identifying the root cause of issues or challenges, which serves as a basis for developing effective solutions. In this case, through analysis of the relevant documents and spatial phenomena in the defined focus areas, previously defined ideas and objectives can be implemented. This further defines flagship projects based on micro-locations of the City, which should be seen as what could be done on the scale of the whole city.

5. **Managing the Tools** is a key aspect of efficient and effective project execution. It plays a significant role in the field of urban planning and green urban regeneration. This method involves the proper organization, maintenance, and utilization of tools, resources, and equipment, both physical and conceptual, to achieve sustainable and environmentally friendly urban development.

6. **GIS (Geographic Information Systems)** is a powerful method used to capture, store, analyze, and present spatial data in a meaningful way. GIS technology integrates various data sources, such as maps, satellite imagery, and geographic databases, to create a comprehensive view of geographic phenomena. This information aids in making informed decisions about land development, transportation networks, and the allocation of resources. In this project, GIS will be a crucial part of monitoring and managing Tutin's spatial resources and their changes throughout the process of implementation.

And in order to blend the main concepts to the project, the following methodology will be applied:

PILLAR 1: Green network

- Activity 1.1 - Defining focus areas, it's characteristics and potentials
- Activity 1.2 - Existing infrastructure research & Analysis
- Activity 1.3 - Creating green infrastructure solutions
- Activity 1.4 - Defining implementation process & possible impacts

Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or European Research Executive Agency (EREA). Neither the European Union nor the granting authority can be held responsible for them.

PILLAR 2: Urban Renovation and Social Sustainability

- Activity 2.1 - Defining focus areas, it's characteristics and potentials
- Activity 2.2 - Research & Analysis of most important social issues
- Activity 2.3 - Creating solutions based on green urban regeneration
- Activity 2.4 - Defining implementation process & possible impacts

PILLAR 3: Sustainable mobility

- Activity 3.1 - it's characteristics and potentials
- Activity 3.2 - Research & Analysis of the Torino transit system
- Activity 3.3 - Creating solutions
- Activity 3.4 - Defining implementation process & possible impacts

3 CASE STUDY ANALYSIS

In this section of the report, the concept of the project and its relation with JGT will be pointed out, and the proposed actions will be explained with the expected social, economic, spatial, and environmental impacts with their spatial dimension.

3.1 Thematic Study Selection

Turin's Urban Green Regeneration aims to transform the city into a sustainable, resilient, and eco-friendly urban environment. This comprehensive strategy encompasses a range of initiatives across various dimensions, addressing challenges and implementing recommendations to achieve its objectives. The specific objectives of the project are:

1. **Environmental Resilience:** Enhance the urban environment by improving the buildings' stock condition, reducing pollution and energy consumption, expanding and connecting green spaces and active mobility lines, and building up resilience to climate change impacts.

2. **Social Equity:** Ensure that all segments of society benefit from green initiatives, reducing economic disparities and improving living conditions.

And the main pillars laying the foundation of the project are:

- Creating a greenery network throughout the city
- Improving the current condition of existing building stock through renovation projects and adjustments
- Promoting sustainable urban mobility

Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or European Research Executive Agency (EREA). Neither the European Union nor the granting authority can be held responsible for them.

And, the core values of Just Green Transition are considered in the project as followed:

- *Transition* - a transition from old and neglected building stock to renewed ones in order to improve the quality of the built environment and decrease the level of CO_2 emission caused by household heating;
- *Green Economy* - supporting local initiatives and technology-based companies in order to promote green economy sectors, and providing job opportunities for young people;
- *Social Justice* - Increasing the quality of built environment of inhabitants;promoting public housing and social mix policies; bridging different districts to set up even development.

Aforementioned, uneven urban development is an important issue for City of Turin, and deteriorating climate change impacts just toughing the lives of the vulnerable classes living in these segregated urban areas. Purposing to cope with these problems, a number of steps have been proposed to implement Urban Green Regeneration. The process of implementation follows a simple yet very effective formula of searching the area of the city of Torino for potential locations or neighborhoods that are in need of green urban regeneration, than doing the analysis of the chose locations, using the previously defined methodology in order to create solutions and plan the execution of the project as well as anticipate its impact on urban future urban development. The main reasons to select the projects areas (i)areas under the risk of flood and urban heat island effects, (ii)deprived zones in the city, and (iii)compatibility with the Turin Municipality's projects.

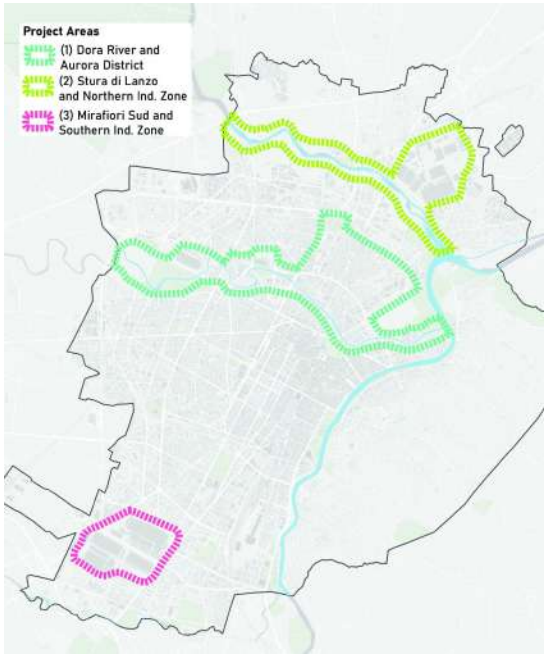


Figure 5. Proposed areas for Urban Green Regeneration

Aiming to realize Urban Green Regenaration, 4 main strategies have been proposed with the actions:

Strategy 1:

Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or European Research Executive Agency (EREA). Neither the European Union nor the granting authority can be held responsible for them.

Enhancing connectivity of urban green spaces and using green&blue infrastructure as a tool to realize climate resilient city

- Connecting fragmented green areas
- Creating greenbelts around the riversides in order to decrease the flood risk
- Designating different active usages for the proposed green areas
- Providing green areas in the walking distance for the all citizens
- Promoting NbS-s on the built environment to support continuity of green axises, investments in green infrastructure projects to reduce flood risks

Strategy 2:

Urban rehabilitation projects to enhance old building stock, and refunctioning the abandoned buildings in order to improve life standards

- Enhancing the building conditions by altering of building elements such as windows, doors, implementation of insulation in order to decrease the CO_2 emission from the buildings
- Promoting public housing in the renovated and/or abandoned buildings to provide accommodation for the vulnerable classes
- Promoting green economies' sectors in Turin and providing job opportunities for youngs
- Promoting NbS-s that can be implemented on buildings
- Implement green building standards and codes

Strategy 3:

Sustainable mobility and 15-minutes city principles

- Redesigning the city by referencing polycentric urban layouts
- Extending public transportation routes by aiming to reach to all over the city
- Connecting bicycle lanes to each other and creating a continuous network
- Enhance public transportation and create green transportation alternatives.

Strategy 4:

Enhancing Social Equity and Increasing Community Engagement

- Foster collaboration between local government, businesses, and communities in order to promote community engagement in the policy-making processes
- Create green jobs by revitalizing abandoned industrial spaces and developing targeted job training programs for green industries aiming to provide job opportunities for the local people
- Promoting social mix policies by aiming integrating different social classes into each other
- Ensure equitable access to green spaces, jobs, and economic opportunities

Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or European Research Executive Agency (EREA). Neither the European Union nor the granting authority can be held responsible for them.

Case Studies from All over the World

How to promote green economies?

Skellefteä is a Swedish city that has been known as "Goldencity" regarding its mining production history. However, deindustrialization initiated shrinkinage in the city, and this trend had continued until 2022. Norhtvoll Ett, which is the first gigaffactory run on 100% renewable energy, has opened 10 minutes away from the city, and brought new blood into the city. This new development is supported with new strategical policies by the Municipality aiming to make the city appealing (Giacometti and Tapia, 2023).

Figure 6. Northvoll Ett

How to prevent gentrification? - *Rent Control Mechanicism from Vienna, Austria*

In the 1980's, a housing problem started to be seen in Vienna. Most of the buildings in Vienna were built before WWII, theferore, there were not in good conditions. In order to rehabilitate the old housing stock in the city, the public money is used to make these structures livable again. After this massive investment by the governmental units, these houses started to be used as public houses, and a rent control system has been built based on buildings' construction year, value of land, location, specific amenities, squares, and inflation rate ("How Vienna ensures", n.d.)

Figure 7. Social houses in Vienna

How to prevent ethnicity based communities and promote social mix policies?

Public Housing in Singapore

80% of the population lives in public houses in Singapore. In order to prevent the social concentration of one ethnicity in the areas, the dispersion of the population is made based on the nationalities (Santangelo, 2023,).

Figure8.Singapore's social house

How to mitigate flood risk with green areas?

Bishan-Ang Mo Kio Park is an urban transformation project to revive the river passing through the city from a linear utilitarian drainage channel to natural river that surrounded by park. This park is also designed as a sponge land in the city to collect water after heavy rains (Wikipedia).

Figure 9. Bishan-Ang Mo Kio Park

Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or European Research Executive Agency (EREA). Neither the European Union nor the granting authority can be held responsible for them.

3.2 Spatialisation of Just Green Transition Impacts

After recognizing our challenges and problems in order to overcome climate challenges and reach our main aim which is green transition firstly,it is need to describe primary targets which are socio physical transition and urban regeneration.

Secondly, describe objectives which are:

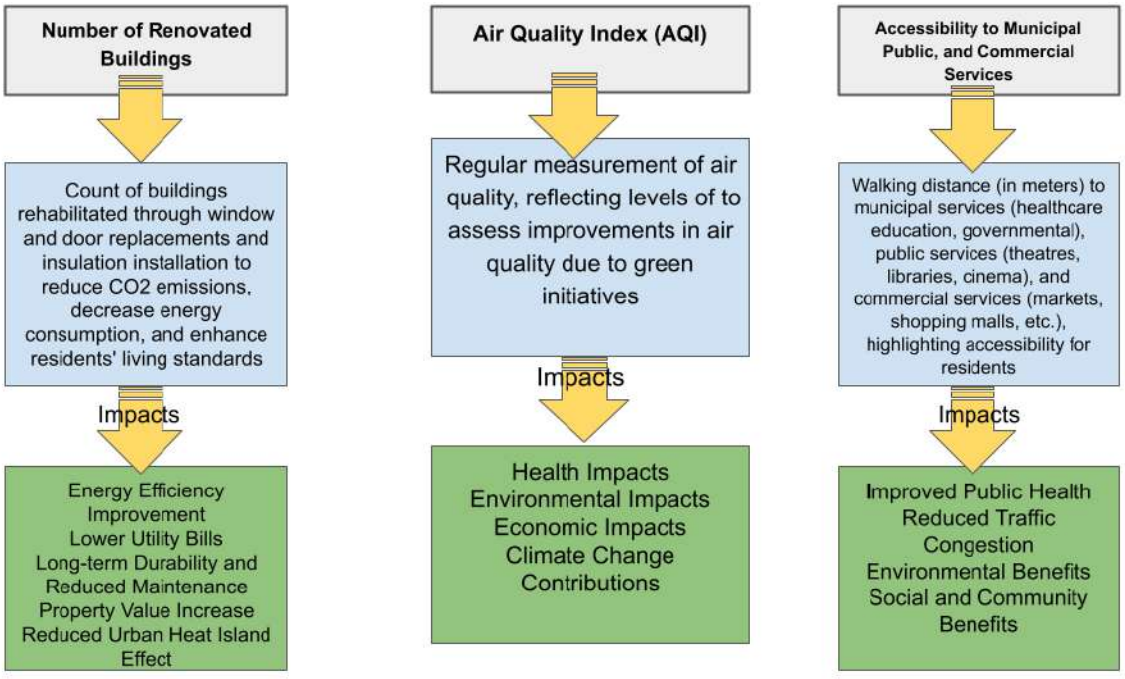
1-Connectivity of urban green spaces

2-Rehabilitation of old building stock, refunctioning the abandoned buildings

3-Sustainable mobility and 15-minutes city principle

4-Enhancing Social Equity and Increasing Community Engagement

and finally concrete indicators:



Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or European Research Executive Agency (EREA). Neither the European Union nor the granting authority can be held responsible for them.

Length of Green Bike Lanes

Measurement of continuous bicycle lanes surrounded by green features, promoting eco-friendly transportation options and urban greenery

Impacts

Improved Public Health
Reduced Traffic Congestion
Reduced Air Pollution
Energy Efficiency

Community Engagement Index

Assessme[illegible]of community involvement and engagement in urban green regeneration projects, indicating the level of public support and participation

Impacts

Sense of Ownership
Increased Social Interaction
Environmental Awareness
Public Funding
Volunteer Efforts

Urban Green Space Index

The ratio of green space area (parks, gardens, etc.) to the total city area, indicating the extent of urban greenery

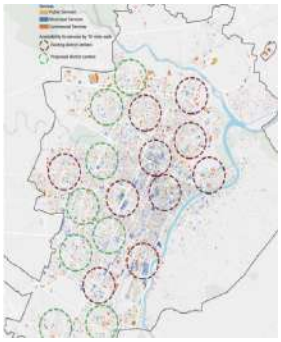
Impacts

Recreation and Physical Activity
Social Benefits
Environmental Benefits
Economic Benefits

possible cycling paths of Network

Promoting walkable city principle by providing public and municipal services in walking distance in order to encourage citizens to take part in city development

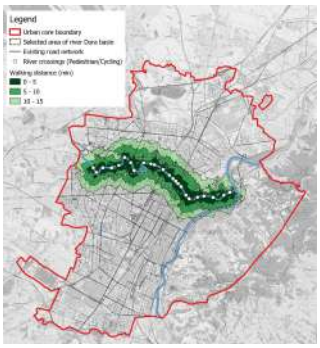
sustainable mobility



OBJECTIVES

Creating green bike lanes connecting green areas and different part of the cities to each other ncreasing the number of shared bicycles around the city

Green Corridor and Walkability



Based on the fact that this networkcan cover a large area of the city, we intended to reach "walking 15 minutes" as a significant average that guaranteed accessibility and connectivity for residents and more

Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or European Research Executive Agency (EREA). Neither the European Union nor the granting authority can be held responsible for them.

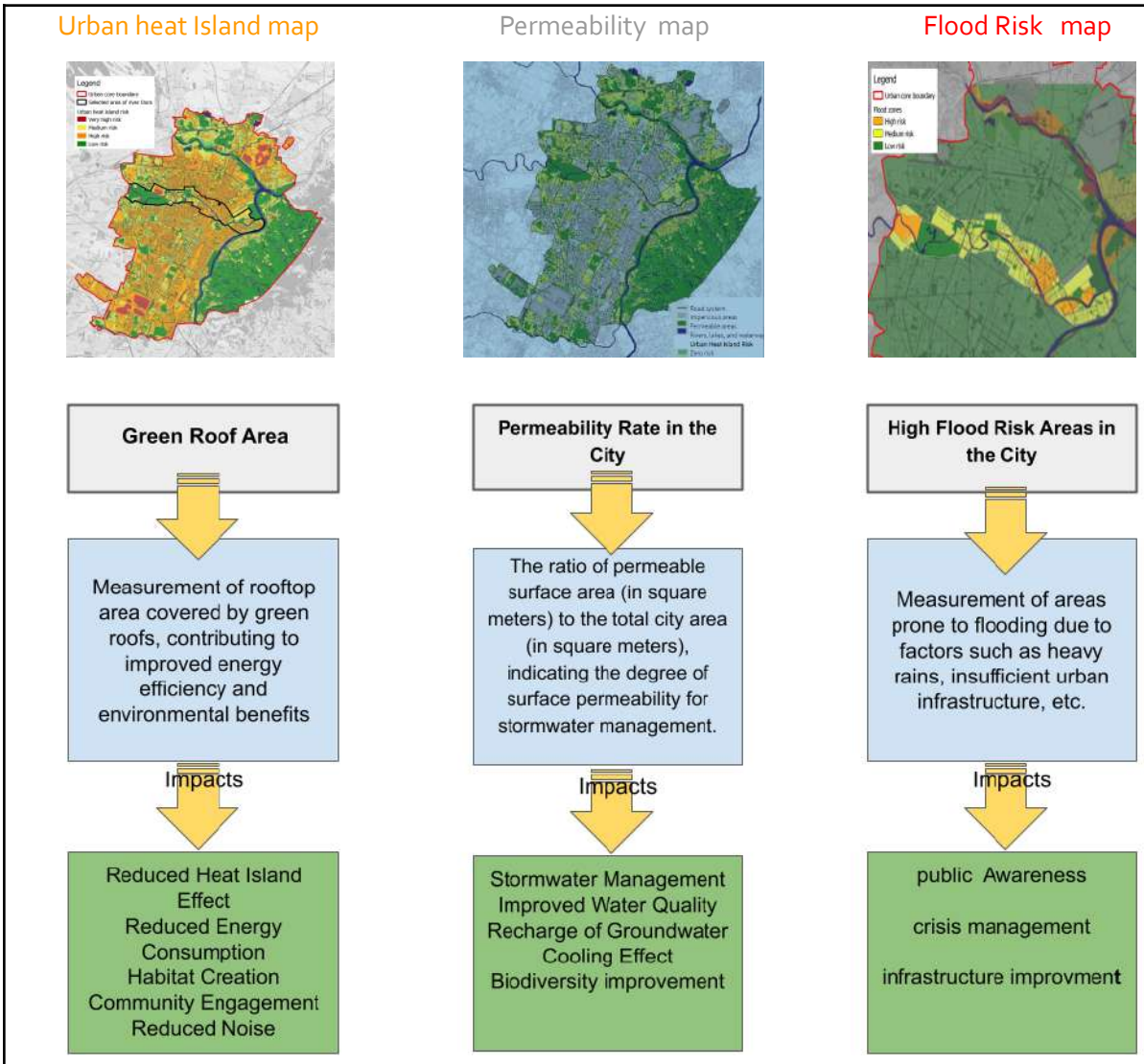


Figure 10-11-12-13. Spatial indicators of proposed project

Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or European Research Executive Agency (EREA). Neither the European Union nor the granting authority can be held responsible for them.

3.3 Cost-Benefit Analyses to measure Just Green Transitions

Green Urban Regeneration is a project that aims to upgrade the built environment's quality with enhancing the green network across the city. Moreover, the project aims to improve social equity in the city with a number of actions and policies. In this respect, Cost and Benefit Analysis (CBA) consists of not only financial expenditures, but also the social benefit that might be gained by the community. Considering the selected project areas, it can be said, Urban Green Regeneration project is a long-term project that will continue for 10 to 30 years. For this project, the main stakeholders are local people, Municipality, and landowners, and in the following, a cost/benefit analysis has been done from their perspectives.

Stakeholder	Benefits	Costs

Municipality	• Better urban quality with
	  ○ Buildings have less carbon emission
	  ○ Refunctioning abandoned buildings
	• Reviving the scattered areas
	• City rebranding with renovation projects
	• Promotion of public&private partnerships
		• Financial cost of renovation projects
		• Environmental cost with CO_2 emission
		• Cost of electricity, water and waste that will be produced during the project
		• Replacement of the local people during the projects

Local People	• Better urban quality with
	  ○ Green Areas
	  ○ Well-cared residential units
	  ○ Healthier urban environemnt
	• New employment opportunities
	• Social benefit that will acquired by 15-mins principles
	• Increased
		• Financial cost to renew the buildings
		• Relocation until the end of the renovation process
		• Cultural degradation by replacing local people during the project

Landowner	• Increasing land value, and getting benefit • New investment opportunities • Having tax reduction in the cases of acceptance of public facilities	• Long-term return process

Relying on this cost and benefits, a possible urban regeneration in Turin will be beneficial particularly for the local people and landowners. And the primary financial aspect of this kind of urban transition project is the profitability for both Turin and people. The selected areas shown above are the scattered parts of the city, and making them a part of the city again will create social and economic

Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or European Research Executive Agency (EREA). Neither the European Union nor the granting authority can be held responsible for them.

benefits. And the main economic indicators to measure this analysis are Net Present Value and Internal rate of returns and cost and benefit ratio.

Net Present Value (NPV)

NPV is the value that shows the future cash flow in an investment by calculating the costs and benefits. While calculating NPS, cash flows, cash outflows, and discount rate at a specific time are considered. In the scope of this project, "Social discount rate" means the expected present value on costs and benefits, it is kept constant 3% when there is no mentioned value as a national approach.

$$\text{Net Present Value} = \left[\sum_{n=0}^{i} \frac{Project\ benefits\ in\ year\ "i"}{(1 + Social\ Discount\ Rate)^i}\right] - \left[\sum_{n=0}^{i} \frac{Project\ cost\ in\ year\ "i"}{(1 + Social\ Discount\ Rate)^i}\right]$$

Figure 14. Formula for Net Present Value

Internal Rate of Returns (IRR)

IRR is an economical measurement tool to understand the annual growth rate of a project. It is calculated in the same way, however, it sets NPV equal to zero. IRR helps to understand the profitability of a potential investment.

$$\text{IRR} = 0 = \left[\sum_{n=0}^{i} \frac{Project\ benefits\ in\ year\ "i"}{(1 + IRR)^i}\right] - \left[\sum_{n=0}^{i} \frac{Project\ cost\ in\ year\ "i"}{(1 + IRR)^i}\right]$$

Figure 15. Formula for Internal Rate of Returns

Cash Flow Analysis

Regarding the resemblances between the Parco Dora Urban Transformation and the proposed project, a cash flow analysis has been done by using land price values in Aurora with the growth rate in real estate in Borgo Vittoria. In this estimation, investment cost, SDR, Future Cash Flow (FCF), NPV, IRR and Benefit/Cost Ratio have been calculated for each square meter (€/m²) . In order estimate the cost for investment, OMI (Osservatiaro del mercato immobiliare) values have been used, and the social discount rate has been kept constant with 3%, and the growth rate has been changed depending on time period. While it is accepted as 5% until 2030, after 2030 it is considered as 15% respecting the opening of Linea 2. Then, the cash-flow and net presen value have been estimated.

Years	2021	2022	2023	2024	2025	2030	2035	2040	2045	2050	2053
Cash Flow (€/m²)	1221	1273	1293	1294	1295	1300	1306	1312	1318	1323	1327
Present Value	1135	1151	1165	1256	1221	1057	916	794	688	596	547

Figure 16. Cash flow and net present value in land prices €/m²

Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or European Research Executive Agency (EREA). Neither the European Union nor the granting authority can be held responsible for them.

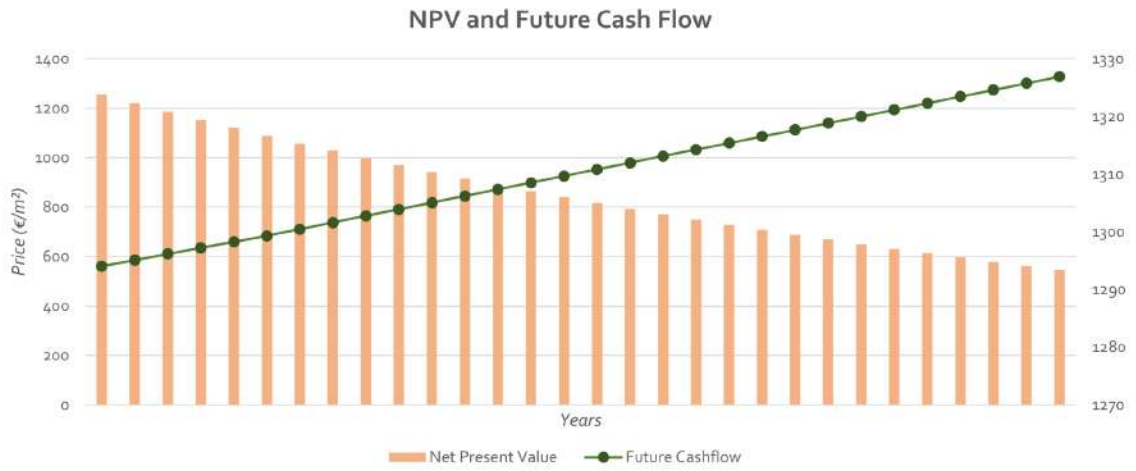


Figure 17. Net present value and future cash flow of the project in the next 30 years

Investment	2,038
SDR	3%
Future Cash Flow	39,308
NPV	25,633
IRR	5%
B/C Ratio	1.58

Figure. Results of Cash-Flow analysis

As a conclusion, although the investment rate is higher than the land prive in the current situation, that can be said, the results of the cash flow analysis indicates that the project will provide benefit for the all stakeholders. Beside the social benefits that have been mentioned before, the relationship between IRR and SDR, and the B/C ratio approve the economic benefit.

In the further steps, conducting a sensitivity analysis by changing the growth rate and social discount rate can assist to evaluate the profitability of the project.

Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or European Research Executive Agency (EREA). Neither the European Union nor the granting authority can be held responsible for them.

3.4 Land-Based financing for Climate Solutions

Land value analysis

Over the past two decades, Focus areas in the far north and south parts of the City, previously marked as undeveloped, abandoned, and historically industrial areas, have been experiencing a steady annual increase in land value. This is possibly a consequence of urbanization and improved infrastructure committed to eco-friendly initiatives due to growing environmental consciousness.

These areas (The Development areas) have been marked as possible points of further improvement when it comes to just green transition, and are:

1. **Stura di Lanzo and Industrial Zone**
2. **Dora River and Aurora District**
3. **Mirafiori Sud**

These Development areas are located in districts where land prices are lower than average (1933€/m²). The lowest land prices are found in **Stura di Lanzo and Industrial Zone** and **Mirafiori Sud** (90% - 100% of the area is under 1500 €/m².

Land price	Stura di Lanzo and Industrial Zone			Dora River and Aurora District			Mirafiori Sud		
	Total area (Km^2)	Share in total area	Share in total area	Total area (Km^2)	Land price area (Km2)	Share in total area	Total area (Km2)	Land price area (Km2)	Share in total area
< 1300	10.7	**2.12**	**20%**	13.4	**9.48**	**71%**	2.97	0	0%
1300 - 1500		**7.3**	**68%**		0	0%		**2.97**	**100 %**
1500 - 1700		0	0%		0	0%		0	0%
1700 - 1900		0	0%		**1.54**	**11%**		0	0%
1900 - 2100		**1.27**	**12%**		**2.32**	**17%**		0	0%
2100 - 2300		0	0%		**0.08**	**1%**		0	0%
2300 - 2500		0	0%		0	0%		0	0%
2500 - 2700		0	0%		0	0%		0	0%
2700 - 2900		0	0%		0	0%		0	0%
2900 - 3100		0	0%		0	0%		0	0%
> 3100		0	0%		0	0%		0	0%

Figure 19. Land prices

Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or European Research Executive Agency (EREA). Neither the European Union nor the granting authority can be held responsible for them.

Mostly all of the area of Development areas are located in districts where land prices are lower than average (**1900 – 2300 euro**). The lowest land prices are located in Stura di Lanzo and Industrial Zone (land price in almost 90% of the area is under 1500 euro) and Mirafiori Sud which is 100% under 1500 euro. Even though roughly 70% of the Dora River and Aurora District land price is under 1300 euros, still it is the priciest Focus area with nearly 30% of it being valued between 1700 and 2300 euros, just around the average price. Likely, the reason behind this price rise is because of the slow, yet intense repurposing of the land use in the past few decades, alongside favorable position in the City.

Development area	Area (km²)	Avg. land value (€/m²)
Stura di Lanzo and Industrial Zone	10.7	1452
Dora River and Aurora District	13.42	1483
Mirafiori Sud	2.97	1399
City of Turin	130.2	1933

Figure 20. Average land prices

Based on land value analysis, that is yet to be completed with land-based financing analysis, certain conclusions can be taken from the results. Further financing of the urban regeneration of underdeveloped, abandoned, or industrial areas of the city can bring positive and negative effects. Positive effects are definitely, more housing, and a higher level of climate change resilience in these neighborhoods. lower carbon footprint and certainly better quality of life in general. However, all these positive effects of investing in green urban regeneration of previously mentioned parts of the city could possibly have a negative effect on the land value to continue growing. This could further create problems for the lower-income population that currently lives in these areas.

In the end, investing in green urban regeneration is a good thing, especially for the city as a whole, but, before the process of implementation starts, the social aspect should be carefully considered and

policies that protect lower-income citizens should be developed to protect them from inevitable effects of gentrification.

Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or European Research Executive Agency (EREA). Neither the European Union nor the granting authority can be held responsible for them.

3.5 Just Green Transition: between carbon-neutrality and re-industrailisation

Objective and Methodology:

Facilitating Turin's just green transition is the main objective for this study while ensuring that it becomes a sustainable and equitable city that thrives economically, environmentally, and socially. This overarching objective is deeply connected to the main aim and challenges faced by Turin.
Turin faces significant challenges in achieving a just and sustainable green transition. These challenges span social, economic, and environmental dimensions. Here are the main challenges that Turin encounters in its pursuit of a just green transition:

1. Economic Challenges:

- **Industrial Legacy**: Turin has a strong industrial heritage, particularly in the automotive sector. Transitioning away from traditional industries towards greener and more sustainable economic activities can be economically challenging, as it may lead to job displacement and economic uncertainties.
- **Investment Requirements**: Implementing sustainable infrastructure, renewable energy projects, and green technologies often requires substantial financial investments. Securing the necessary funding and attracting private-sector investments can be challenging.
- **Economic Disparities**: Economic disparities within the city can pose a challenge to ensuring that the benefits of the green transition are distributed equitably. Vulnerable or marginalized communities may struggle to access new job opportunities and resources.

2. Social Challenges:

- **Social Equity**: Achieving a just green transition means ensuring that all segments of society benefit from environmental improvements. However, disadvantaged communities who live in deprived parts of the city may face barriers to accessing green spaces, affordable housing, and sustainable transportation options.
- **Community Engagement**: Engaging and involving the community in decision-making processes related to green initiatives can be challenging. Ensuring that residents have a voice in shaping the city's sustainable development is essential for a just transition.
- **Job Transition**: As traditional industries evolve or decline, workers in those sectors may face job displacement. Providing retraining and transition programs to equip workers with new skills for green jobs is a critical challenge.

3. Challenges Related to Nature and Built Environment:

- **Air Quality and Pollution**: Turin struggles with air quality issues and pollution, which can harm public health. Transitioning to cleaner energy sources and reducing emissions from transportation are essential for improving air quality.

Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or European Research Executive Agency (EREA). Neither the European Union nor the granting authority can be held responsible for them.

- **Biodiversity Loss**: Urbanization and development can lead to habitat loss and a decline in biodiversity. Balancing urban growth with conservation efforts to protect local ecosystems is a challenge.
- **Climate Change Resilience**: Turin must adapt to the challenges posed by climate change, including extreme weather events and flooding. Developing resilient infrastructure and sustainable urban planning is essential.
- **Old Building Stock:** Rapid industrialization can cause abrupt population increase, and oblige local governments to build more housing units in a very short time. And Turin has a lot of buildings that provided shelter and a workplace for the outcomers, however, nowadays these buildings are neglected or abandoned. Providing a well-designed, high quality built environment for the inhabitants is essential to increase life standards in Turin.

4. Infrastructure and Transportation Challenges:

- **Public Transportation**: Expanding and improving public transportation infrastructure can be logistically and financially challenging. Ensuring that it is accessible, efficient, and affordable for all residents is a priority.
- **Active Transportation**: Considering the inadequate bicycle infrastructure, encouraging walking and cycling as sustainable modes of transportation requires investments in infrastructure like bike lanes and pedestrian-friendly pathways.

5. Political and Regulatory Challenges:

- **Policy Consistency**: Ensuring that green policies and regulations are consistent and aligned across different levels of government can be challenging, as they may vary between local, regional, and national authorities.
- **Political Will**: Sustaining a long-term commitment to green initiatives may face political challenges, as leadership changes can affect the direction and prioritisation of sustainability efforts.

Addressing these challenges will require a multi-faceted approach involving government, businesses, civil society, and the community. Collaboration, innovation, and a commitment to social and environmental justice will be key to achieving a just green transition in Turin.
The Urban Green Regeneration of Turin case study has a holistic approach addressing social, economic, environmental, and political challenges. By implementing recommendations and tracking indicators, Turin will be prepared to create a more sustainable, liveable, and resilient urban environment while reducing CO_2 emissions and enhancing the well-being of its residents. Success will rely on coordinated efforts, public engagement, and ongoing commitment to a greener future.

Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or European Research Executive Agency (EREA). Neither the European Union nor the granting authority can be held responsible for them.

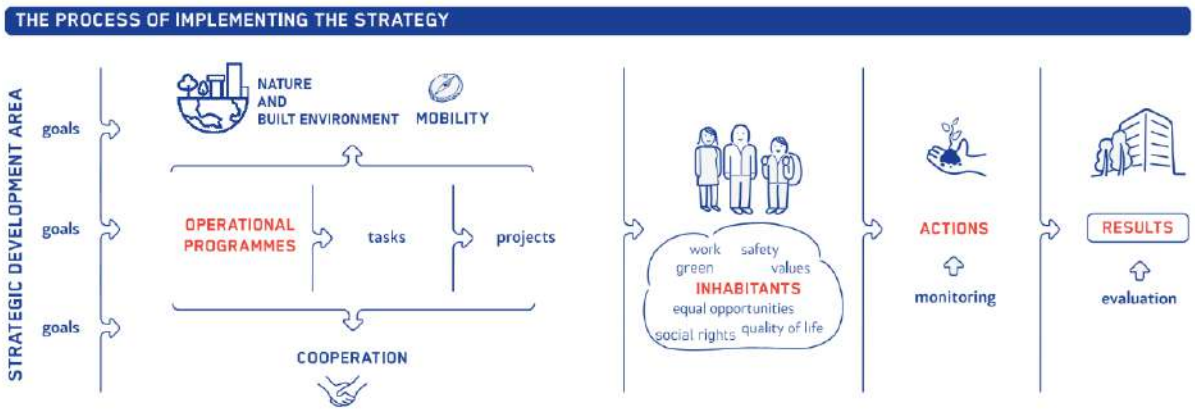


Figure 21. Process of implementing the strategy (Adapted from Gdansk Strategical Plan)

4 POLICY ADVICE AND RECOMMENDATIONS

Overarching Objective:
The overarching objective of our proposal is to achieve a just and sustainable green transition in the city of Turin. This entails transforming Turin into an environmentally sustainable, resilient, vibrant, and socially equitable urban environment while mitigating carbon emissions and enhancing overall quality of life.

Aligning its development with the principles and goals outlined in the EU Green Deal, Turin can achieve sustainable and environmentally friendly urban development by implementing the following policy recommendations:

Open Spaces:

- **Policy Recommendation**: Invest in the creation and maintenance of green spaces and urban parks within Turin. Prioritise the development of green corridors and pedestrian-friendly zones.
- **Rationale**: The European Green Agenda emphasizes the importance of accessible green spaces within urban areas to improve air quality, creating sponge zones in the city, reduce urban heat islands, and enhance the overall quality of life for residents.

Biodiversity and Green Roofs:

- **Policy Recommendation**: Encourage the installation of green roofs and support urban biodiversity initiatives.
- **Rationale**: Promoting biodiversity and incorporating green infrastructure into urban planning can enhance the city's resilience to climate change and contribute to overall environmental sustainability.

Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or European Research Executive Agency (EREA). Neither the European Union nor the granting authority can be held responsible for them.

Renovating the existing building stock:

- **Policy Recommendation**: Develop and enforce building codes that prioritise emissioning less CO_2 by promoting energy-efficient construction and retrofitting of existing buildings while improving the quality of built environment and enhancing life standards.
- **Rationale**: Quality of the built environment has crucial influence on life standards of the people. Living in a well-designed and well-cared built environment is part of the right of the city. Besides the easiness and aesthetital advantages, renovating the buildings can help reducing energy consumption in buildings to meet the European Green Agenda's goals of lowering greenhouse gas emissions. Turin should incentivise energy-efficient practices and renewable energy adoption.

Refunctioning the abandoned industrial buildings

- **Policy Recommendation**: Promoting renovation and reusage of neglected and old buildings for the benefit of society by converting them social houses, workplaces, and cultural centers.
- **Rationale**: Refunctioning of the industrial buildings can help to highlight industrial heritage of the city and demonstrate the beginning of the new transition method which aims to realize a climate-resilience city taking into consideration social, economic, and environmental aspects of the city.

Promoting Social Housing and Social Mix Policies

- **Policy Recommendation:** Promoting social housing in the renovated buildings to provide affordable housing stock for the vulnerable classes. In order to keep the housing prices on the affordable level, a rent control system is taken into account with the implementation of social mix policies to avoid ethnic enclaves.
- **Rationale:** Increasing rent prices and lack of housing stock in Turin,make sdificult finding affordable houses for the vulnerable classes. Another attendant problem is clusters that have been created based on ethnicities.Inspring from the cities that have dealt the same problem with a number of policies, implementation of similar policy changes can help to build more inclusive and improve equity in the city.

Polycentral Urban Layout and 15-Minute Cities

- **Policy Recommendation:** Redesigning city layout along with the 15-mins city principle by creating a multi-central structure to provide all the services within walking distance.
- **Rationale:** Torino is a city that has partially fragmented urban morphology in order to reachability to the services. Considering the vulnerable classes and their accessibility to urban services such as commercial, educational, and health facilities, promoting district centers that provide all the urban services within walking distance has the potential to improve the living standards of all citizens significantly.

Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or European Research Executive Agency (EREA). Neither the European Union nor the granting authority can be held responsible for them.

Sustainable Transportation:

- **Policy Recommendation**: Promote sustainable transportation options, such as expanding the public transportation network, creating dedicated bike lanes, and encouraging electric vehicle use.
- **Rationale**: Reducing carbon emissions from transportation is a key component of the European Green Agenda. Turin should prioritise sustainable mobility to decrease traffic congestion and improve air quality.

Community Engagement and Education:

- **Policy Recommendation**: Foster community engagement through educational programs and initiatives that raise awareness about environmental issues and sustainability.
- **Rationale**: The European Green Agenda emphasises the importance of involving citizens in decision-making and educating them about sustainable practices.

Collaboration and Funding:

- **Policy Recommendation**: Seek partnerships with regional, national, cross-border and European organizations to access funding opportunities for sustainable urban development projects.
- **Rationale**: Collaborating with external partners can help Turin secure the necessary resources and expertise to implement sustainable initiatives effectively.

By adopting these policy recommendations, Turin can align its urban development efforts with the European Green Deal, promoting a more sustainable, resilient, and environmentally friendly city while contributing to broader European sustainability goals.

Future design alternatives suggestions

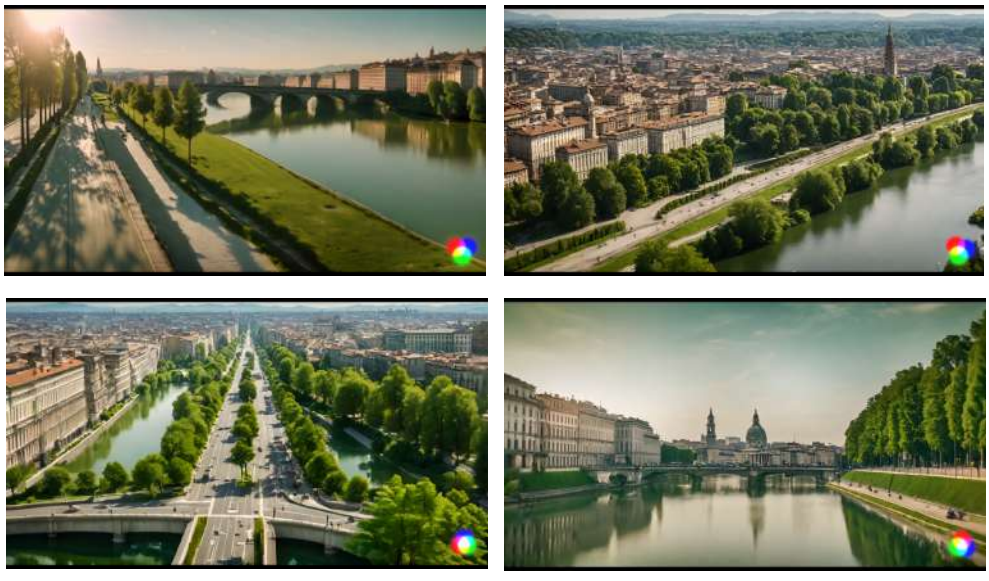


Figure 22. Scenes from proposed project (Prepared by "Runway" AI image generator)

Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or European Research Executive Agency (EREA). Neither the European Union nor the granting authority can be held responsible for them.

Future design alternatives suggestions

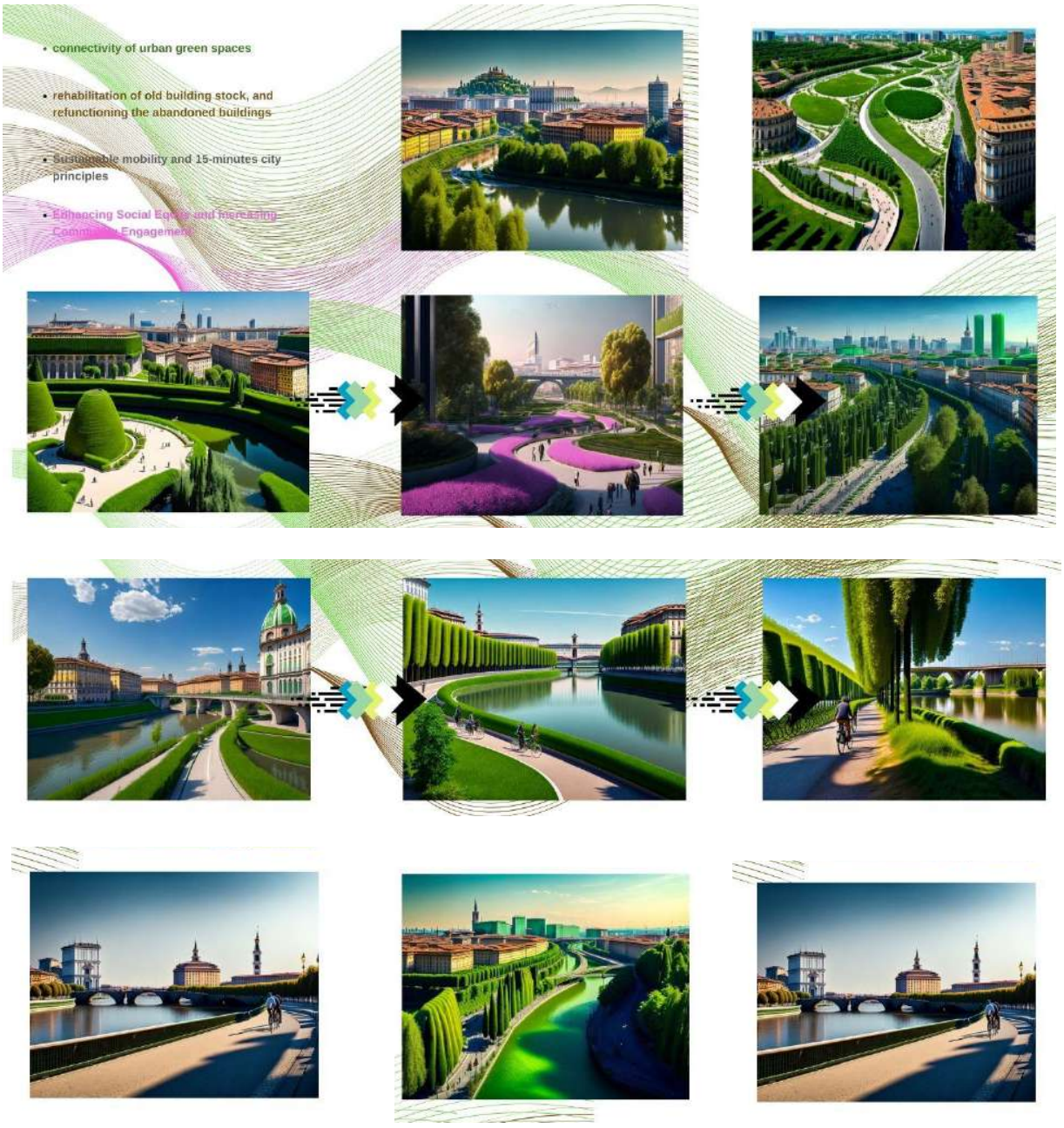


Figure 23. Scenes from proposed project (Prepared by "Runway" AI image generator)

Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or European Research Executive Agency (EREA). Neither the European Union nor the granting authority can be held responsible for them.

5 REFERENCES

"Linea 2 Della Metropolitana", (n.d.). Retrieved from: https://www.torinocambia.it/la-linea-2-della-metropolitana).

Citta Metropolitana di Torino. (2019a). Piano strategico metropolitano 2021-2023-Asse 2. Accessed: Oct. 02, 2023. [Online]. Available: http://www.cittametropolitana.torino.it/cms/sviluppo-economico/piano-strategico/psm-asse2

Citta Metropolitana di Torino. (2019b). Piano strategico metropolitano 2021-2023-Asse 3. Accessed: Oct. 02, 2023. [Online]. Available: http://www.cittametropolitana.torino.it/cms/sviluppo-economico/piano-strategico/psm-asse3

Deambragio, E. (2023, Sept 18). Turin path within 100 Climate Neutral Cities Eu Mission. [Presentation].

European Commission. (2019). The European Green Deal. Communication from the Commision to the European Parliament, The European Council. Accessed: Aug. 09, 2023. [Online]. Available: https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1588580774040&uri=CELEX:52019DC0640

EU (2020, Dec). Territorial Agenda: 2030 - A future for all places,"Accessed: Aug. 09, 2023. [Online]. Available: https://territorialagenda.eu/wp-content/uploads/TA2030_jun2021_en.pdf

EU. (2021). Territorial Agenda 2030 - A future for all places - Summary.

Lucchini, C. (2023, Sept 19). Torino dopo l'industria. Presentation in Torino Urban Lab

Santangelo, M., 2023, "Singapore, Global Urban Geography, [Lecture Notes] PoliTo Didattico Portale

Spenelli, Q. (2023, Sept 19.). Rethinking Turin: Challenges, Strategies, Opportunities. Presentation in Torino urban Lab)

"Runway". (n.d.). [Image]. Retrieved from https://app.runwayml.com

Funded by the European Union

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or European Research Executive Agency (EREA). Neither the European Union nor the granting authority can be held responsible for them.