



Co-Creating Circular
Resource Flows in Cities

constRuctive mEtabolic processes For materiaL fIOWs in
urban and peri-urban environments across Europe

A REFLOW CASE STUDY

Planning a Circular Paris

Finding Space for Circularity in a High-Cost, Growing City



*This project has received funding from the European Union's Horizon 2020
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Figure 1: Photo by [Alexander Kagan](#) on [Unsplash](#)

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Introduction

In the summer of 2019, the Paris REFLOW team began their work on transforming wood material flows in the city's event and temporary construction industries from linear¹ to circular² as part of the three-year EU Horizon 2020 project, REFLOW. The Paris REFLOW team had approached Amelie, an urban planner working for the Municipality of Paris, with an assessment of what was needed to realise this aim, with hopes that Amelie could push their case forward in the municipality's Planning Department. The Paris REFLOW team had pinpointed the importance of logistics, specifically storage space in the urban area, as an important component of circular economy infrastructure needed to close the loop.

The project presented from the Paris REFLOW team involved a specific piece of land in the city which they wanted to use as a storage facility for reuse wood. By having this storage facility in the city, they believed they could realize their aim of transitioning the events and temporary construction industry towards becoming circular and regenerative. The site was located in a former industrial district in Paris, with close access to the city centre and with existing industrial infrastructure, including an industrial building with high ceilings, space for offloading and loading, parking, and transport access.

Since Amelie was working as an urban planner for the Municipality of Paris, her duties were to uphold the municipal planning interests and visions while also considering the needs of the citizens of Paris. The overall area of the site that the Paris REFLOW team had pinpointed had been slated for review by the Municipality of Paris as an area for urban regeneration. As part of urban regeneration in the municipality's eyes, the site should increase its use and function, in line with the vision for creating more an inclusive, complete, and green neighbourhood in the city. The Paris REFLOW team understood the pressing need for housing, active transportation, and green spaces in the city, but they pushed for Amelie's review as they were also challenged by the lack of suitable land and existing industrial buildings for storage facilities in Paris – especially those that had enough space for wood.

Amelie found the Paris REFLOW team's project intriguing and saw the potential of its ability to foster more circular flows in the city and to reach the municipality's vision of a Circular Paris by 2030 as well as to contribute to a more sustainable future. At the same time, she was also juggling other municipal planning interests, pressing priorities needed in Paris, and different players who

¹ Linear refers to an economic model following the principles of 'take-make-waste'. In this system, value is built up from producing and selling as many products as possible. Production of these products follow the linear steps of extracting often finite supplies of raw materials, transforming these into products, using these products, and then discarding these products as waste.

² Becoming circular refers to transitioning towards a circular economy (CE). CE is an economic system that is regenerative by design. Circular economy sees the elimination of waste and the recirculation of resources to tackle the challenges of global climate change, biodiversity loss, waste, and pollution. A circular and regenerative city in REFLOW represents an urban system with social and business practices which place equal attention to social, environmental, and economic impact; where technology is open and represents a central enabler of positive social and environmental change; where the urban system ensures and supports the resilience of social and ecological systems; where governance is collaborative and inclusive; where knowledge is shared, and stakeholders are active and involved.



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each had a stake in the site. Amelie was expected to assess the dilemma and provide her professional stance on the situation. With the growing municipal push for circularity in the city, but also increasing land use pressures associated with housing, environmental concern and competitive commercial office space, the question of whether space for logistics, in this case, storage space for wood belonged in the contemporary city of Paris and if so, how?

Post-Industrial Paris

Paris is a global city, in the ranks with London and New York. In 2019, the region of Paris sat at the heart of France's economy and was home to 12.5 million residents, with 2.16 million inhabitants living in the municipality of Paris³. As the economic engine of France, Paris was at this time the fourth largest metropolitan economy globally⁴. The increasing pressures and challenges associated with globalization had pushed many cities around the world to recalibrate and to adapt their economic strategies to the reality of global forces – shifting from industrial economies and transforming societies into knowledge-based service economies and consumption societies. As a world-class city, Paris was driven to ensure their competitiveness and therefore, generate a supportive climate for people and business that could induce innovation and warrant a high quality of life. To retain its spot on the global stage, Paris was continually reinventing itself to address the pressing contemporary challenges of its time through its urban planning and economic development strategies.

In the company of other deindustrialized European cities, Paris had transformed the majority of its former industrial parts of the city and economy with hindsight towards a globally competitive future. With this transition, industry had become no longer a lucrative or prioritized land use in the city. Former industrial lands and buildings were continually converted and reclaimed into new living, office, and green spaces, providing Parisians with regenerated and inclusive places to innovate, recreate, and live. These urban transformations were underlying the Paris REFLOW team's concerns with circular economy infrastructure in the city, as these suitable lands for storage and manufacturing were disappearing. In addition to this major urban economic and societal transition towards a post-industrial Paris, urban planning in Paris was also influenced and guided by specific agenda items and visions for the contemporary city. As a municipal urban planner, the following conditions provided the framework in which Amelie had to consider and sustain in her assessment of the dilemma.

Circular Ambitions

The climate change crisis had placed increasing pressure on the city's continuous evolution and kick-started the nascent rethinking of how things were being made and consumed, leading to the vision for a Circular Paris. The Paris Circular Economy Plan afforded the city an action plan for its transition towards becoming circular and regenerative. This transition was deemed as a necessary element for the Municipality of Paris to reach its ambitious vision of becoming a sustainable, cohesive, responsible, and resilient cityⁱ. To achieve this, the plan pinpointed five key areas for a

³ https://www.citypopulation.de/en/france/paris/paris/75056__paris/

⁴ https://www.brookings.edu/wp-content/uploads/2016/11/qci_paris-nov42016-64p-lr.pdf



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circular future: (1) planning and construction, (2) reduction, reuse, and repair, (3) support for actors, (4) public procurement, and (5) responsible consumption. At the time, the region of Paris was importing 80% of their resources and producing vast amounts of waste⁵. Contrary to the domineering post-industrial logic driving the city's development, circular economy ambitions in Paris brought the idea of production coming back into the city. With a circular vision set out, Paris was focused on rethinking this model of consumption, production, and disposal in the city through the re-localization of resources and processes of re-manufacturing and logistics – highlighting a key spatial issue for the city – where and how would this fit into the dense, expensive, and exclusive city.

The 15-Minute City

With the post-industrial transformation and outlooks towards climate mitigation and adaptation planning, the city also worked towards creating a greener and more climate-resilient future for its residents. To realize this, under mayoral direction, Paris implemented the urbanism concept of becoming a '15-Minute City'. Under this notion, all essential activities that needed to be carried out by citizens could be done within a 15-minute radius by public transportation, foot, or bicycle. With this vision for the city came the reduction of private transportation by car, pushing the city towards becoming a greener and cleaner place for Parisians. A core principle to the '15-Minute City' involved planning and redeveloping complete, dense, and walkable communities that had nearby public and active transportation, multi-functional spaces, and mixed-uses. Consequently, space for more sustainable modes of transportation, mainly cycling, as opposed to private vehicle traffic was a core element to implementing this concept in the city. This resulted in the pledge by the Mayor of Paris in 2020 to push for the removal of 70,000 parking spaces in the city and the replacement of traffic lanes for sidewalks and bike lanes. Through this plan, Paris could be made into a more environmentally-friendly, resilient and more human-centred city. While the principles underlying a 15-minute city contributed to what could be deemed as a good city, the removal of important infrastructure to support logistic and manufacturing activities such as parking and transportation routes posed a spatial and operational challenge for urban industry.

Housing and Density

Alongside the interventions to address growing climate change challenges, increasing pressures for housing were needed in the city to not only house a growing and ageing urban population, but to also address increasing social inequalities and affordability concerns. Under the regional master plan, Schema Directeur, the vision towards social and economic development was employed through sustainable public transportation investments, reducing social segregation, and ensuring the maintenance of the Paris region's position on the international stage of economic growth and development⁶. Importantly, the plan also stipulated the requirement for an additional 60,000

⁵ <https://www.chooseparisregion.org/industries/circular-economy>

⁶

https://planinfo.erhvervsstyrelsen.dk/sites/default/files/media/publikation/analysing_contemporary_metropolian_spatial_plans_in_europe_elinbaum_galland_2015.pdf



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homes every year in the region until 2030⁷ to accommodate the expected population of 2.23 million inhabitants in 2050⁸.

The additional housing requirement was needed to offset the lack of affordable housing supply in the region since the cost of housing continued to be on the rise in Paris. Between 2000 and 2014, rent had increased by nearly 75%⁹. Due to the lack of space, this housing challenge was addressed through the regional master plan's emphasis on strategically designing Paris to be an even more densely compact and inclusive city. In line with the 15-minute city vision, this meant that the city needed to plan for affordable, accessible spaces including a portfolio of land uses in each city block. While multi-functionality was a solution to integrating different land uses into a dense and compact space, from Amelie's experience, backlash from residents was a common occurrence. Many stating that they did not want certain land uses such as manufacturing or logistics as their neighbour because they were loud, dirty, and a nuisance to an everyday, healthy life in the city. Moreover, many of these Parisians did not believe that these uses even belonged in the city.

Logistics Sprawl

On the flip side, coinciding with the need to increase the density and compactness of Paris to address housing and environmental concerns, curbing logistics sprawl in the region of Paris had also become an important topic on the planning agenda. Similar to suburban sprawl, in which the city spread out into lower density and generally monofunctional areas, logistic land uses had done the same. Much of this sprawling was fuelled by the fact that the peripheries of urban areas were generally better suited for industry and logistics following the increase of urban renewal projects in Paris during the 1960s and 1970s¹⁰.

The urban periphery had enabling factors which included easier access to roadways, lower costs, and more abundance of space, something that the post-industrial city did not have. Despite having a better business climate suited for these industrial needs, there were also downfalls. Logistics sprawling had become a problem in the region by exacerbating the environmental challenges in Paris associated with the need for larger surface areas and longer transportation routes to move goods. Moreover, land was used inefficiently and in a monofunctional and dispersed way. For the city to transition towards becoming more circular and regenerative, while also ensuring economic diversity and decreasing their carbon emissions associated with transport and the imports of resources, the reversal of logistics sprawling needed to be addressed.

⁷ <https://core.ac.uk/download/pdf/82003841.pdf>

⁸ <https://www.insee.fr/fr/statistiques/3201222#tableau-figure3>

⁹ <https://www.lafabriquedelacite.com/en/publications/paris-can-densification-rescue-affordable-housing/>

¹⁰ *The impacts of logistics sprawl: How does location of parcel transport terminals affect the energy efficiency of goods' movement in Paris and what can we do about it?* Dablanc and Rakotonarivo (2010).



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The Event and Temporary Construction Industry in Paris

The current state of the event and temporary construction industry in Paris was not circular. In fact, for many organisations in these industries, incorporating more circular practices was unfeasible and time consuming. The standard across these industries involved the supply of new wood materials from big suppliers who could send out the requested products just-in-time and at a cheaper cost.

Much of this was due to the fact that the event and temporary industry was both time- and customer-specific. Events for example occurred usually only once a year for a specific customer and lasted only for a short period of time at a temporary site. For the event industry, this meant that during construction and deconstruction, the building sites needed to be completed and taken down in a time efficient manner. Moreover, due to increasingly rising costs of space in the city, many of these organisations could not justify keeping and reusing the wood materials for the event again next year. This was because these materials took up valuable space in their already costly workshops. For these industries, it was cheaper to buy new from a large supplier every time and to demolish and dispose of the building waste rather than to use space in their workshops for deadstock materials, which could potentially sit there unused for long periods of time.

While there were some event and temporary construction industries working to incorporate more circular sourcing of wood materials, the scale of suppliers offering reuse wood was at a smaller scale. The average reuse wood supplier was a small business spread out across the city offering a variety of ad-hoc cuts of wood. This meant that construction and event industries would need to use more time to source the correct pieces of materials for the project at hand, and since every project was specifically geared towards their customers' wishes, this process was time-consuming and financially unrealistic. Furthermore, the time it would take for the different makers and manufacturers to drop-off and supply their used wood to be sold at the scattered, small reuse storage facilities did not yield any financial gain.

Logic of Wood Use

Reuse wood materials, as opposed to new resources, were significantly heterogeneous in size, material type, and quality. Furthermore, these materials were naturally spacious and heavy, making them logistically more difficult to store within already cramped city spaces. The actors who were using reuse wood at the time were often smaller companies and freelance designers who purchased small amounts of stock often. But because these reuse materials varied in size, material type, and quality, as well as the fact that these reuse materials were not consistently supplied since their supplies depended on the deconstruction of former structures, there was no good overview or consistency. Therefore, this inconsistency and unreliability made it hard for local makers and manufacturers to budget in these more circular processes into their workflow.

This meant that local makers and manufacturers who wanted to use reuse wood would have to spend time and therefore money to be able to search and purchase their materials that would fit their specific project. For them to be able to drive the demand for reuse wood, and thereby contribute to shifting the event and temporary construction industries to become more circular,



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they needed reuse wood to be stored centrally and with easy access. They also needed large storage facilities to make it easy for them to find what they were looking for across all combinations of size, material type, and quality.

Shortage of Space

Despite this need for central and large storage of reuse wood materials, this was challenging in a large and densely populated city like Paris due to several factors. Spaces for storage, manufacturing, and other logistical uses were continuing to dwindle in Paris, as these types of spaces were losing the competition against housing, offices, and green areas. This meant that it was increasingly difficult and unfeasible for companies to find and operate storage facilities in the city. This lack of land supply then contributed to the financial challenge of storage space. Low supply of land pushed up the prices for renting space, a common situation for large, growing cities. Storage spaces needed to store and have a fast throughput to earn enough to pay rent, which was still difficult due to lack of and inconsistent demand. Without a fast turnover of the reuse wood materials, simply storing wood generated no value-added.

Because of the costly storage, the price of used wood was pushed up and the wood was stored in a way that made it cumbersome and inefficient for customers to find what they needed. This created a self-fulfilling prophecy: demand for used wood did not take off. At the end of the day, it turned out to be cheaper and easier for the event and temporary construction industries to buy and use new wood materials each time.

The Paris REFLOW Team's Vision for Storage Space and Circular Economy

The vision that the Paris REFLOW team had presented to Amelie aimed to address the challenge towards incorporating more circularity within the event and temporary construction industry. The Paris REFLOW team put forward the importance of storage space for reuse wood materials as a crucial component of making the shift towards circular event and temporary construction industries. This was because a key barrier to recirculating and reusing wood materials was in fact, logistics. Seeing this barrier towards making a circular shift in wood material flows, the Paris REFLOW team found it important that this aspect of circular economy be highlighted. Space for logistics, including storage space were often overlooked, underappreciated, and undervalued activities as part of circular economy transitions and within the structure of the contemporary city.

With an idea of the current practices of event and temporary construction industries in mind, the Paris REFLOW team saw that the ability to have a storage facility where reuse wood materials could be centrally located in the city would give the economic scale needed to provide a variety of materials that could be browsed through, ordered, and delivered in time and with ease. Moreover, having a storage facility in the city would allow for the material flows of wood resources to stay localised through its use in events and construction sites around Paris. It would also provide a circular source of materials for local makers and manufacturers.



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A city location also meant easy and quick access between local makers and manufacturers and the supplier. This would make it easier and more feasible not only for the supply of reuse materials, but also allowing for a centralized place for the makers and manufacturers to drop-off their materials after deconstruction in a cost- and time-efficient manner. Additionally, having a larger and more centralised storage space would help to forego the challenges that smaller storage spaces and workshops housing reuse materials were dealing with, including lack of space, long periods of storage time, and the financial burdens of space used for storage.

This REFLOW Paris team's plan for a storage facility encompassed a former industrial site in the city of Paris that they had presented to Amelie. The site had an existing 2000 m² industrial building on it complete with high ceilings, enough space for machinery needed for operations, doors wide enough for loading in large wood, space for vehicles to park during pick-ups and drop-offs, and even shelving installed by the previous user. The area around the site was mostly industrial, but in recent years new commercial shops, cafes, and restaurants had started to spring up. This recent development had followed the conversion of an industrial building into expensive apartments a few blocks down. While there was still some industry in the area, these actors had begun to experience some backlash from their new residential neighbours who had started complaining about the noise, dust, and trucks that were driving in and out of the area. Moreover, these industrial actors had also noticed a sharp increase in their rents since the recent developments and were becoming progressively financially strained.

The Paris REFLOW team saw this site as the last potential haven for this sort of activity to be carried out in the city and really pushed for Amelie's support on the matter.

The Other Players

The site in question where the Paris REFLOW team had drawn up their proposal for the storage facility had many other players involved with varying interests and visions for its future development. As a municipal urban planner for Paris, Amelie not only had to consider the bigger picture of adhering to and meeting the municipal needs and interest, but she also needed to facilitate and balance a portfolio of differing party interests and desires. As part of her due diligence, she met with the representatives of each of the parties to gain a complete picture of the situation and to gather insights for her final decision for the Paris REFLOW team.

Local Industry

Amelie met with Julius, a woodworker who had worked and lived in the area for the past 20 years. As a representative of the existing local industry in the area, Julius stated that he and other fellow local industry actors felt as though they were being pushed out of the city. They had been in the area for a long time already and had established their businesses and their customer bases. Moreover, they were also Parisians at heart and felt that they belonged in the city, not only in terms of residing, but also with regards to their workplace. Julius and the local industries in the area were onboard with the Paris REFLOW team's idea for a storage facility because they also wanted to incorporate more circularity into their processes and thought that this storage space could act as



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an important catalyst for more local makers and manufacturers to get on board. Additionally, Julius and the local industry players also felt that having a circular storage space would help to reconceptualise what industry was in the eyes of people outside the trades. For a long time, Julius felt that him and fellow industry actors were stigmatized by environmentalists, residents, and the municipality as being dirty business, but in fact this was not true.

Julius knew that local industry also contributed a lot to the urban economy and to their local communities by supplying the city with locally made, repaired or refurbished products. He also knew that their existence was crucial not only for their sake but also for incorporating more economic diversity into the city's landscape. As of now, they felt that the city was just becoming a place only for people who could work behind a desk and who were out of touch with how things were produced. Julius believed that local industry could be important in helping to close the loop through their visibility and localization of all stages of production – including manufacturing, repair, and reuse facilities.

Non-Profit Affordable Housing Developer

Marie was a manager at one of the largest non-profit affordable housing developers in France which had had their eyes on this site. Marie denoted the increasing pressure on their organisation to serve the needs of underprivileged Parisians who needed a home, and she knew that if they could convert the site into residential apartments, they would be able to provide around 120 affordable units. By allowing for these affordable housing units to be constructed on the site, the challenge of growing spatial and social inequality could be addressed. With the current supply of affordable housing units being subpar and with over 260,000 people on the waiting list for public housing¹¹, space for affordable housing was imperative.

The NIMBY Association

NIMBYism¹² was a worldwide phenomenon in the planning profession and as an urban planner, Amelie was all too familiar with this type of player. The previous residential conversion down the road from the site had introduced new residential players into the mix who were in strong opposition to further industrial activity introduced into the area. The residents had put together an association that was strongly opposed to the use of this site as a storage space. Amelie met with Pierre, who was the head of the association, a father of 2 young children and worked as a manager in an insurance firm in the Paris city centre. Pierre explained the association's opposition and told Amelie that they believed that this land use would invite even more traffic into the area, and they were concerned for their children's safety from increased traffic and their health from the transport fumes and the dirty work that went on in the facility. Further, the association thought that this land use would be very loud and disturbing. They believed that the city should be for people to enjoy and not for dirty, loud work. Having a green space for the residents to relax in and for the neighbourhood's children to safely play in was a top priority for Pierre and the association.

¹¹ <https://www.bloomberg.com/news/articles/2021-09-25/transforming-a-paris-landmark-into-public-housing>

¹² NIMBY stands for "Not In My Backyard" indicating a strong opposition of an actor who does not want a certain development to take place in their neighbourhood or in a certain part of the city.



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While they understood that industry was important and that it provided jobs, they did not want it in their neighbourhood and questioned why they couldn't just be located outside of the city boundaries where all the other industry was.

The Owner

Amelie reached out to Celine, the property manager for the owner of the site. Celine and her team had been waiting for the right moment to capitalize on the property. With the increasing demand for luxury housing in industrial loft-style apartments she knew this could be a huge profit for the owner. She was also aware that converting the space into commercial offices could also be a lucrative opportunity for them. Celine told Amelie that a conversion of the property into luxury housing or hip commercial office spaces could help the Municipality of Paris to attract the creative class to the city and help to blossom the city's innovative and creative ecosystem – and ultimately, Paris' competitive edge. At the moment, the profits gained from industrial land use was not the highest it could be. With the previous renter moved out, Celine and her team thought that this could be perfect timing for them to apply to redevelop the existing land use and structure.

Time to Decide

The arguments and underlying reasons from the Paris REFLOW team were clear, in the sense that there was a huge need for central and spacious storing to enable the transition to circularity. However, Amelie was also faced with the visions and goals of the municipality and the other players who were interested in the site.

With the overview of the challenges, solutions, interests, and municipal planning priorities she was balancing, Amelie now needed to provide her professional input on the situation. Should she argue for prioritizing for logistical space in the city? Or would this land use be best fit in other places outside the city? She knew that social inequalities were only growing in the city and that there was an increasing need for affordable housing. Just the same, Amelie also needed to ensure that Paris could maintain its global status and competitive edge as an innovative, creative, and thriving city. But she also knew that introducing other employment opportunities into the city through land uses such as logistics would help to provide a more balanced set of occupations in the urban economy and further accelerate the transition towards circularity. With the pressing environmental concern, reversing unsustainable practices in the city was a top priority. As the consultations were coming to a close, it was time for Amelie to present her recommendations, but she was still pondering which direction was the best to take for the site and how she would make it all work for all those Involved.



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