



# SMART-ECO-CITIES

**SMART-ECO CITIES IN FRANCE:**

**TRENDS AND CITY PROFILES 2017**

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# **SMART ECO CITIES IN FRANCE : TRENDS AND CITY PROFILES 2017**

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E.U. ORA PROJECT

smart**eco**cities

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## INTRODUCTION

### The SMART-ECO Cities Project

This report forms a part of a series also covering China, UK, Germany, and the Netherlands. It draws on preliminary findings from a three-year (2015–2018), ANR-funded research project titled *Smart Eco-cities for a Green economy: A Comparative Study of Europe and China*.

The project is being coordinated by the University of Exeter, in collaboration with an interdisciplinary team of researchers from King's College London, the Universities of Westminster, Plymouth and Cardiff (UK), TU Delft and Utrecht University (the Netherlands), Freiburg University (Germany), the University of Nottingham Ningbo China, and Taiwan National University. The CRM-CNRS, University of Toulouse I coordinated the team in France, including researchers from the Maison des Sciences de l'Homme, Bordeaux, and from the University of Paris Nanterre (LESC-CNRS). As well as funding from the French ANR, the research is supported by the national funding agencies of China, Germany, Netherlands and the UK.

The focus of our research is on the '*smart eco-city*'. The '*smart eco-city*' concept intends to capture recent trends in urban development schemes where both '*green*' and '*smart*' ambitions converge. More precisely, the smart eco-city is defined as an "*experimental city* which functions as a potential *niche* where both environmental and economic reforms can be tested and introduced in areas which are both spatially proximate (the surrounding region) and in an international context (through networks of knowledge, technology, policy learning and transfer and learning)".

The idea of the '*experimental city*' refers to recent work identifying a tendency for new urban technologies to be tested at a limited scale, often through cross-sectoral partnership approaches, and with the aim of learning lessons, where traditionally firmer policy commitments might have been expected (Bulkeley & Castán Broto 2013; Karvonen & van Heur 2014; Evans et al. 2016). The concept of the '*niche*' is taken from the expanding field of '*socio-technical transitions*', which studies the processes through which innovations come about and are taken up in society more widely (Geels 2002; Kemp et al. 2007).

Each of the national reports profiles a series of cities, selected on the basis that they have relatively substantial smart-eco ambitions and/or activities already taking place. This selection was made following a wider '*horizon scan*' of smart and eco initiatives taking place in each country. The intention is not to promote the profiled cities as necessarily representing the '*best practice*' examples in the field, but rather to illustrate the variety of '*actually existing*' smart-eco cities practices in each country. The profiles provide a contextual overview of each city's aims, relevant policies, and the key actors involved, along with short descriptions of some of the main activities or projects taking place on the ground.

For more information on the SMART-ECO research project, and to download the other reports in the series, please visit our website: [www.smart-eco-cities.org](http://www.smart-eco-cities.org)

### SMART-ECO Cities in France: the French Institutional Landscape

The smart-eco city trend, as presented in the previous paragraph of this report, is only now emerging as far as France is concerned. It would be no exaggeration to say that, compared with the British or the Dutch landscape, the French smart-eco horizon seems to be lagging behind. A good illustration is the case of Paris, which elaborated smart-eco-city policies relatively recently. This could be attributed, as we will see, to a lack of consistent national policy and enabling frameworks in this domain.

Singular initiatives of interest have however taken place in a handful of cities, generally strongly supported by city mayors and their teams, to define ambitious urban development projects and be part of the 'smart city' trend, which now appears in many places as a must-have policy in the territorial marketing game (Begg 1999).

#### *National policy and the lack of an integrated smart city programme*

Strangely enough in a country well known for its central state policy, the French Government seems to have become aware of the stakes associated with the development and promotion of smart cities only recently. Several reports have been issued since 2012, and intended to promote a national and strategic view on the topic (Danielou et al. 2012, Rochet, 2014, Peyet 2014, Eveno et al. 2018). The Peyet report to the Prime Minister of the French Republic was issued in May 2014. It called for a national policy to promote multi-dimensional urban development, but did so from the viewpoint of eco-cities (Peyet 2014).

A number of national programmes, run by different bodies of Government, have been of use to smart cities initiatives. The first one is the 'French Tech' project. Created by the French ministry of economy in 2015, its goal was to encourage and federate startup development in the ITC sector. It works both through identifying relevant actors in the startup ecosystem, by labelling them (startupper, but also investors, consultants, incubators, R&D agencies), and by supporting their fast development. This included training, funding (an estimated €200 million was distributed by the Public Investment Bank), mentoring and assistance to internationalization. In 2016, a network of 14 Metropolises (including Paris) obtained the French tech label, and 12 'French Tech Hubs' abroad became members.

The second one is the 'eco-quartier' label (Eco-district). Created by the French ministry of Ecology in 2008 after a national conference called 'Grenelles de l'environnement', its goal was to encourage the emergence of virtuous eco-district initiatives and experiments in sustainable urban development by allocating funds and a national label to the best practices in the country. The initiative emphasized participatory methods, sustainable development and use of resources and waste, as well as improving the quality of life. In 2016, 39 city districts had been granted the Eco-quartier label.

A third project of interest is the 'Investment for the future'. After the subprime crisis struck the French Government decided to launch a large Keynesian operation in 2010 to stimulate the economy and facilitate the transition to the future in areas such as energy, research, transport, digital economy, and urban development. Some cities were able to skilfully combine different



funding sources such as ‘the digital cities fund’ or ‘the ecocities fund’ to develop components of a larger projects. It is worth mentioning that one such fund – (estimated at one billion euros by Danielou 2012)- was called ‘Cities of tomorrow’, and provided an incentive to promote integrated and inter-disciplinary experiments.

‘Plan Climat’ is the fourth initiative we would like to mention. Since 2000, France–has been committed to the reduction of greenhouse gases. In 2004, the Plan Climat national programme aimed to ‘support local authorities so that they establish their own plan for the climate’ (Ministry of ecology, 2004, Plan Climat pour la France 2004).

### *A variety of city-level smart initiatives*

The patchy and limited nature of these initiatives and the lack of a global, dedicated national smart city programme led cities to take the initiative and become the major actors in the construction of the first smart-cities experiments in France. An integrative perspective, based on a clear urban development vision was in need, and the most interesting examples of urban development have been to a large extent based on the ability of a few cities to provide such a leadership and an integrated vision. The five cases surveyed in this report illustrate this point.

As we will see, the design and implementation of an integrative perspective as been variously performed. In the absence of a central and dominant reference case, a variety of experiments have been carried out.

To account for the variety of individual cases in the French landscape, we found it useful to group cases by a few variables making up a tentative typology (Cowley and Jolivet, 2018). The three key variables in this typology are as follows:

- *city size and political agenda.* According to our approach, smart city initiatives relate to multidimensional issues, and thus require an integrative perspective. Such a perspective implies a political vision of the city as a consistent entity. This in turn relates to the size of the city.
- *the relation between the city and technology.* The literature underlined this dichotomy between ‘techno push’ approaches and ‘community based’ smart cities (Picon 2016). In techno push approaches, the city is becoming a playground where large international companies apply and develop layers of standardized state-of-art IT platforms and applications. Community based approaches may be described as ‘demand pull’: they attempt to establish idiosyncratic experimental settings in order to co-create unique solutions to local issues in which technological artefacts are inter-twined with social structures. This distinction seems to raise governance questions such as who retains the power of decision and the relationship with technology (Smith 2018).
- *the nature of the experimentation.* To what extent is the city strategically committed to becoming smart? Are we talking about a mere ‘smart-washing’ communication exercise, a test-bed or window narrowly confined to one district of the city, or an agenda of deep and committed urban transformation?

### 1. *City size and political agenda*

Unexpectedly, the French government has not provided a universal smart city framework and or standard, nor supplied an overall political agenda. To become smart, in the sense of integrating different existing issues into a more consistent smart-eco vision, cities had to develop their own agendas.

Since the resulting political smart-eco city strategies appear rather differentiated, we introduced a distinction between the French metropolises and mid-size cities. To clarify this point, a quick overview of France territorial urban organization might be of use. Historically, Paris has been the administrative, economic, cultural and political centre of the country, 'irrigating' a number of smaller cities covering the territory (see the Braudel 'centre-periphery' model). But this has gradually evolved recently into a multipolar arrangement. An important North-South axis of three 'millionaire cities' counter-balanced earlier centralization, connecting the territory to the Northern Europe and Southern Mediterranean areas (Lille, Lyon, Marseille). More recently, a West-East U-shaped crescent seems to have gradually become more active (Nantes, Bordeaux, Toulouse, Montpellier, Nice, Grenoble). Bordeaux, Toulouse and to a lesser extent Nice are good candidates for becoming *millionaire cities* (Linton 1958) within the next 10 years (INSEE 2013).

Most of these metropolises have realized that they are entering some global territorial competition to attract, to retain and develop what has been wrapped in the term *creative class* (Florida, 2003) and that smart-eco policies might play an important role in this game. We believe there is some sort of 'iron-cage'-isomorphism effect for cities in this category: to become or remain leading cultural and political cities in Europe and the world, they must become 'SMART'.

In France, the smart city concept might have appeared as an opportunity for the provincial metropolis to emancipate, to further connect to Europe and the world, thus becoming less dependent on Paris. This would explain why Paris remained relatively inactive in the matter. Lille, Lyon and Nice on the other hand, fairly actively engaged with smart city activities, with Montpellier, Toulouse and Bordeaux following suit.

Beyond these large cities and their internationalization agendas, a handful of mid-size cities have equally taken part in the smart-eco movement in France. According to a recent survey, in terms of volume, there are more mid-size than large cities committed to smart initiatives in France (El Hassani 2017). Dijon for instance – with about 250,000 inhabitants in its urban agglomeration – has been ranked a distinguished example of advanced smart city in Europe by the respected Giffinger European report (Giffinger et al. 2007, Le Monde 2018). In Europe, according to Giffinger, the population of mid-size cities equals that of large cities (Giffinger 2018). Mid-size cities seem to have political agendas of a different order, compared with the metropolises: they range from the fear of being left behind and declining, to a mid-size category internal game of differentiation and positioning against comparator cities. Building an attractive image remains the major issue here.



### *2. The relation between city and technology and the governance question*

Using the traditional dichotomy between techno-push and demand pull, the literature on smart cities invites us to distinguish the role and place offered to technology in smart cities experiments. Associated with this difference, the issue of who is benefitting from the experiment and whether it is used as a democracy-enhancing or control-enhancing mechanism matters (Picon 2016).

#### *Technology provider initiatives*

In many instances, the smart city projects have involved public authorities calling upon large private consortia of international companies which were offering them state-of-the-art technological platforms. Various significant agreements and relationships have been established with international IT companies by cities like Issy-les-Moulineaux, Nice or Montpellier – to name but a few. The commercialization of ‘smart solutions’ has proved very attractive to prestigious multinational companies (including IBM, CISCO, Microsoft, General Electric, Toshiba, Toyota, and Panasonic), which clearly identified an opportunity after the 2008 crisis to scoop up some city accounts with more integrated solutions and applications as well as to enrich their R&D actions by opening them more widely to local authorities.

In turn, this isomorphism has pushed French large companies to structure a competitive offer as a response (DiMaggio & Powell 1983). That is of course IT and Telecom companies with a direct stake with their counterparts. Interestingly, this has also been the case for companies traditionally servicing local authorities for facilities such as water, energy and transport (Veolia, Vincy, EDF, Engie for example) or working closely with them (SNCF, La Poste, Bouygues). Surprisingly enough, they together formed an industrial consortium called VIVAPOLIS, to address the need for integrative perspectives.

Even if it was not systematic, the large international tech providers seeking economies of scale are certainly a major carrier for the standardization and dissemination of universal technological platforms and applications. They are supported by international consultancies, international integrators in the field of urban development and renovation (like international architecture offices, or more general consulting companies such as Arup and Accenture).

Equally important to this techno-push trend is the blooming of classification and rankings of all kinds. International classifications have exacerbated city rivalry and competition against a few possibly arbitrary criteria (Evans 2014). Importantly, international comparisons are facilitated if the compared cities are using similar standardized platforms and solutions. Whether the criteria set to measure performance were objective or not, comprehensive or not, whether they consistently match local political agendas or not, as long as they had impact on fund raising, branding and reputation, they became performative. Interestingly, large international solution providers have been quickly involved in the promotion of such ranking exercises.

#### *The key role of cities*

History matters. In some cases indeed, a number of initiatives – sometimes long-lasting and often IT-based – existed at the city level way before the smart city concept was even invented. In some

instances, smart-eco initiatives serve to rework or recombine older digital or sustainable projects initiatives: this is the case in Nice and Issy-Les Moulineau (on the outskirts of Paris), for example.

This makes the integrative, multi-technologies and cross-issues nature of the smart city a specific contemporary phenomenon. In other words, the essence of smart city approach that differentiates it from previous more disciplinary (ICT or Eco mainly) and focused urban development projects (often at the scale of a city district) is precisely its integrative attempt (Danielou, 2012, Rochet, 2014). This is why the integrative character of smart cities project has been emphasized in this report. Cases like Lyon and Bordeaux illustrate this point particularly well.

The need for integrated views and projects that would make sense of this proliferation of schemes and incentives has been, we believe, key in the French smart cities landscape. Local agencies were (or were not) in a position to make sense of and instrumentalize this context to make an integrated, federating urban plan for the service of their population. This explains why practices are so diverse and place-specific on the ground, with few commonalities between cities at first sight.

It would probably be inappropriate to talk about a 'market for smart cities' in France. To date, what we are observing is a handful of cities holding a strategic / political agenda on their own, and perceiving the smart cities trend as an opportunity for implementing it. The centrality of the role they offer to large international technology providers varies significantly from one city to another, even though all of the cities involved have established some relationship with them.

### 3. *Commitment to transformative change*

A final distinctive variable amongst the different experiments taking place in France relates to the nature of the commitment of the city to the smart experiment. Some cities in our sample seem to communicate a lot about their initiatives, but when investigated, a good share of these projects were already in existence and are now relabelled under the fashionable name of *smart cities*. Beyond the name, a very patchy collection of diverse projects with limited common ground and consistency can sometimes be found. As we have seen earlier, the advent of both an integrative perspective and of a clear incorporated political agenda are central, and cases in which this does not hold might easily fall into a category of 'smart-washing' cities.

A second category of cities, materially committed to smart-eco initiatives, perform their demonstrations mainly within the confined area of a designated district. The area of the city selected – most often identified for retrofitting – is then becoming the test-bed, the district-scale prototype to try out many different solutions and applications, learn about them and adapt them before they could be validated and possibly extended to other areas, in the city, or even in some cases beyond the walls of the city as a service to other urban area. Good illustrative cases in France are Lyon and Lille.

A third type in our collection of cases use the smart-eco city umbrella to serve the purpose of transitioning the city, transforming it into a whole different organization. In this case, the smart-eco initiatives are just one part of a larger and longer term urban plan. One such case is certainly Bordeaux, and to a certain extent, Nice seems to be following the same path.

## Criteria Used to Select Case Study Cities

Our selection method entailed shortlisting cities in France which: (a) have moved towards integrative perspective on smart-eco projects; (b) are thinking about a smarter city for the future as a global political project; and (c) include both digital and 'eco' activities within their overall programmes.

In 2017, some cities were only beginning to consider this perspective, so they could not be included in our sample selection, as one of our requirements for inclusion was the availability of some material proof of the city's commitment and some first visible results to be observable. This implies that the present report does not intend to be the final word on smart cities initiatives and practices in France, but rather, an initial survey. Future reports and survey, including the forthcoming report to the Government (Eveno et al. 2018) are no doubt going to complement our investigation in an updated and comprehensive way.

A first criterion used concerned the commitment of candidate cities to *multiple* issues (ecological, economical, social). This yielded an initial shortlist of 28 cities involved in Digital districts or Eco districts experiments. They were identified thanks to the combination of three national labels: the historical label of *Digital Cities*, the *Eco-district* label delivered by the ministry of ecology, and the *French tech* label delivered by the Ministry of Economy. Of course, this requirement might have left a few candidates unnoticed even if they were actually active in the field. Considering the funding issues associated with obtaining the label, this might play particularly against small and mid-size cities that do not always have the personnel and the know-how required to enter the labelling contest. On the other hand, cities that obtained the three labels have provided sufficient material proof of their commitment to digital and eco projects.

Another criterion concerned the existence of an integrative perspective, a political agenda for the city to make use of technology at the service of the citizen. This was approached through a combination of online documentation and expert interviews (\*).

Finally, and through the same process of combined documentary analysis and expert interviews, we tested the reality of cities commitment. Accordingly, the 5 cities selected – Bordeaux, Lille, Lyon, Nice, Toulouse – were the most advanced in terms of smart city experimentation. In addition, the 5 selected cities exhibit an urban development project involving smart and eco ambitions, public-private partnerships, national and international networks of actors involved.

The reader may have noticed that our five selected cases all feature among the candidates to become 'future millionaire' metropolises: all of them have an agenda to transform into an attractive, world connected, creative and to some extent independent urban entity.

(\*) We are very grateful here to both Emmanuel Eveno and Alain d'Iribarne, who shared their experience and long-term investigations on French digital cities and smart cities with us. Their expertise and the data they provided helped us significantly in the selection/ sampling process that gave birth to this report. Any mistakes, nevertheless, remain our own.

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## BORDEAUX

Author: Eric Jolivet

*'A few European cities are trying to articulate their ancient past with their recent development, their breathless city centre with their tentacular outskirt territories. Among them Bordeaux now represents a school case, for its spectacular metamorphosis. The enterprise is impressive: action in the centre, action on the aisles, by points, by lines, by surfaces, by the creation of a large electric network, and new links. We have seen works everywhere, battles on many fronts, quick as a Napoleonic campaign. Because the city was to be reinvented ... or almost.*

*Getting it out of a boring gentrification, out of a withdrawal on the triangle of its classical boulevards, waking up its large abandoned port and its neglected banks was essential. A new synergy was necessary, opened to the future, between the new poles of a spacious territory, a new being, the new configuration of a multipolar city. A new European metropolis is born in the process. Its destiny was written in several centuries, but the flow of time had stopped. It was necessary to get it back on track, and therefore imagine a new link between the past and the future, to open the city again towards an unpredictable future.'*

Christian de Portzamparc, Architect.

## Introduction

Bordeaux is a port city situated in the South-West of France, and is the capital city of Aquitaine. Historically, the golden age of the city was between the 16<sup>th</sup> and the early 19<sup>th</sup> century, a period during which Bordeaux became the first commercial port of France, benefitting from a privileged and historical relationship with the UK, but also Flanders, Holland and Germany, then being a central place in the trades of colonial empires (Higounet 1980). *'Its activity and its success have relied on this openness and the density of its ties with other important places in the Atlantic and the North Sea'* (Victoire 2007). As a result, most influent families in the city were traders, many of them being protestant families from the UK, Holland, and Germany that brought with them the material and social capital and the tricks of the trade for international exchange and shipping as it developed after the 16<sup>th</sup> century (Victoire 2007). During this period, the wealthy city was reconfigured into a modern, humanist, enlightened, 18<sup>th</sup> century triumphant-stone-style city that still today comprises its visual identity and largely contributed to its notification by UNESCO.

It would not be possible to mention Bordeaux's name without mentioning its world-famous wine, of course. Even if Bordeaux also historically traded other valuable products notably pastel dye from the Toulouse region in the 16<sup>th</sup> and 17<sup>th</sup> centuries, cod from Canada, rum and sugar cane from Antigua, its local wine prominently sustained its trading activities over the centuries. Appreciated by English people from the 12<sup>th</sup> century on, it was also later shipped to other northern European countries, notably Holland. Two elements contributed to this situation: (a) the city enjoyed unique and long-standing ties with England (Aquitaine was ruled by the English Crown

between the 12<sup>th</sup> and the 15<sup>th</sup> centuries) and remained very actively related to Great Britain; and (b) the city was very involved with northern European trade expansion (Flanders, Holland, Germany, Ireland and England in particular) which resulted in the quick internationalization of its port activities in the 17<sup>th</sup>-18<sup>th</sup> centuries. As a consequence, Bordeaux wine became an international product fairly early in history. In return, it contributed to the establishment of modern wine making techniques -the application of science - and branding in the 19<sup>th</sup> and 20<sup>th</sup> centuries and built a worldwide reputation of prestige, high quality, high standard, sophisticated and high-end product.

Many observers considered that this glorious period was followed by a slow decline, during which the city gradually 'fell asleep' (Bordeaux City 2010), remaining to some extent conservative of this golden age, and reluctant to industrialize (Higounet 1980). Nowadays, Bordeaux has indeed retrograded to the ninth largest city in the country. But this observation obscures the fact that it is precisely enjoying an important revival. Together with Toulouse and Nantes, the metropolis of Bordeaux is one of the fastest growing in France. Among other fields, tourism is strongly developing, Bordeaux being nicely located on the sunny Atlantic coast on the way to Spain, a world level aeronautic industry shared with the Toulouse region, and a dynamic service sector emerging. In addition, in line with its past of enlightened city, Bordeaux has a long tradition of excellence in cultural, intellectual, higher education and research activities.

### 'Bordeaux 2030' Urban Plan

To accompany this urban revival and economic development, an ambitious urban plan was conceived (Bordeaux city 2010). Its first part was presented by the, then, new city mayor, Alain Juppé, French Prime Minister at the time, in 1996, and aimed at renovating and re-densifying the city centre to prevent further '*Californian style*' urban sprawling (Bordeaux's suburban area had grown rapidly to 700,000 inhabitants while the city centre remained at about 200,000) and to regenerate its peripheral industrial areas. The first phase consisted in renovating the river bank, channelling and controlling car traffic by developing alternative and soft transport like creating a tramway network, rethinking public spaces to resume with the European tradition of places and streets as places of interactions between citizens, renovating the classical and neo-classical heritage buildings. To do this, political consensus and public participation was nurtured, as well as calling on prestigious and talented architects to reveal the city to itself, to help re-invent/retrieve its quality of life. UNESCO rewarded this effort to reconnect Bordeaux city Centre with its unique history and heritage in June 2007 by awarding it World Heritage status.

The mayor and his team fundamentally conceived the urban project as a cultural activity, a work on collective identity, past, present and future, a perception of the world, a reflection on how citizens interact and relate to one another and live together. '*I believe that the city, in itself, whatever it is, is secreting culture*', says the Mayor, '*a novel way of life, evidently, is the carrier ... of constitutive elements that allow for the hatching of a new culture, that is always the product of a vision, of a conception or the world*'. This is why '*we are organizing, unknowingly, 'acquired forms of behaviours*' (M. Mauss definition of culture nda).

In such a perspective, urban planning remains primarily a political action: '*We must help Bordeaux people to understand the world in which they evolve, help them not to be afraid of it, help them*



*step forward joyfully into the future. Through dialogue, of course, through education, cultural events, new forms of debates'* (Bordeaux City 2010). 'Agora' is a case in point. Born in 2004 to deliver the price of architecture of the city of Bordeaux, it gradually became Bordeaux Biennial of Architecture, Urbanism and Design, an attractive cultural event where Bordeaux people and others come to hear and talk about cities and urbanism with prominent guests and through thematic exhibitions.

The second part of the plan aimed to articulate and integrate this novel and extended urban entity: the peripheral areas, the two banks of the Garonne, the north and the south of the city, and the other 28 towns composing Bordeaux Metropolis – with the ambition to be one of the 50 'millionaire cities' in Europe by 2030. To do this, a multi-level (city, metropolis, region) and multi-actor consensus was founded through the elaboration of a joint vision of the future (Bordeaux City 2010). Part of the project has been coordinated by the experienced team involved in the first phase, including the Mayor of Bordeaux who has been elected for his third mandate, building on its tradition for political consensus and deepening its method for public participation. The other part, orchestrated by a mix body, called Euratlantique, made up of local representatives and State representatives, aimed at regenerating a wide area around the station to make it, together with a new urban area, a highly attractive and up-to-date business centre, a digital city and a hub for startups (Bordeaux Euratlantique, 2010). Through a series of infrastructural improvements (fast train tracks, tramway and buses lines, highways, port, bridges), and district retrofitting, the intention is to connect Bordeaux to the world. This includes important communication and green technological dimensions.

Smart-eco initiatives took place in this long-term urban renewal context. The idea behind Bordeaux smart city initiatives is that innovative cities will reinvent themselves in the direction of more sustainable eco-systems, using advanced technologies to serve better quality of life. Therefore, most of the Bordeaux initiatives have both smart and eco components in them.

The vision is that smart-eco initiatives should not be confined to a few demonstrating windows in one or two districts, but rather be spread all over the city and benefit everybody. This is the sense of the mayor's statement that *'it would be reducing and inefficient to build an urban project on the realization of a few new eco-districts. The sustainable city must above all be the existing city because it represents 90% of the territory'*. He calls for a global reflection on sustainability through actions like *'economizing fossil fuels, encouraging renewable energies, using renewable and as much as possible local materials, economizing water and practicing a reasonable use of plants and to reach that goal, launch, at every level, a challenge to innovation'* (Bordeaux City, 2010). Mobility is a central issue in the sustainability plan, but again, better organization of the city is preferred to the deployment of decontextualized and standardized technological solutions alone, for instance by reflecting on *'reducing the distance between jobs and housing'* (Bordeaux city 2010).

An original perspective on the relationship between the metropolis and its natural heritage has taken shape recently (Agora 2017). The concept is to prevent segmentation, nature and landscape having to be part of the city (Orsena 2018).

## Examples of Projects

### Bassins à Flots

'Les bassins à flots will be the most sought-after district of Bordeaux by these who want both a very urban environment in a magic landscape, sustainable housing and direct access to the city centre' (A Juppé, Bordeaux City 2010).

The Bassins à flots project is an 'exemplary one' for several reasons. First, it represents an attempt to establish a bridge between the historical city of Bordeaux (the neighbouring district Chartrons being the home of many important and influential families from the 17<sup>th</sup> and 18<sup>th</sup> centuries) and its outskirts (on the other side of the Bassin is a very popular district, with a strong workers and craftsmen memory but somewhat isolated from the rest of the city called Bacalan). In between, the Bassins à Flots used to be an industrial area, related to the port activities, but it faced a dramatic economic decline in the postwar period and its related disaffection to gradually become a brownfield site. Second, thanks to the construction of a new bridge (the Chaban-Delmas bridge named after the previous influential mayor) over the Garonne at the Bassins, it is expected to become one of the major connecting points between the left and the right banks of the river. The general layout of the project is therefore organized around mobilities and flows, driving cars to the Chaban-Delmas bridge, pleasure and commercial boats on the water bassins right to the Garonne estuary and to the Atlantic, cycling and walking through the 'trails' of the district up to the banks of the Garonne and the sides of the bassins.

The Bassins à flots project is exemplary because it is one of the first workshops in France, as an urban experiment, aiming at fabricating a full urban district of this scale (approximately 160 hectares, with 700,000 square meters of housing, offices and shops, and 22 hectares of water, for an expected 10,000 new inhabitants), conducted by the local Bordeaux team and its Mayor. Housing and buildings have been designed to be sustainable, low energy-consumption, connected to the heat network using 70% local and renewable energy, but also limited in terms of car use by favouring soft (cycling, walking) and public transport. The district has become a lively one due to a conscious choice to mix housing and economic activities (creative activities, design and management schools, small businesses associated with shipbuilding and maintenance, water leisure and tourism). An innovative urban planning method has been tried out, so called 'negotiated urban planning'. Structured and on-going public participation was encouraged, as well as a continuous discussion between architects, promoters, policy makers, urban planners and administrators in a place called 'l'atelier des Bassins' located in 'la Maison du projet' (House of the project) at the heart of the area. As a result, this challenging project is considered to be a success as about 70% of the programme was built in only four years, in line with expectations and specifications. This method has now been extended to other districts of Bordeaux, and has attracted attention at the national and European levels.

<http://www.bordeaux2030.fr/bordeaux-demain/Bassins-flot>

### Bordeaux Euratlantique

Since 2 July 2017, the High Speed train line connecting Bordeaux to Paris has been in operation. The journey now takes 2 hours (instead of 3.5 beforehand) and it is expected to attract a whole new population of highly connected urban people. Further investments are expected to connect Bordeaux to Toulouse in 1 hour, Bordeaux to Bilbao in 2 hours, and Bordeaux to Madrid in 3.5 hours. To welcome these people and the businesses that would go with it, Bordeaux Euratlantique, a public development corporation (EPA), has been established to develop the area and in the first place the station and its surroundings.

No fewer than 20 million passengers are forecasted to arrive each year, some visiting a few hours, some staying a few days, some deciding to establish themselves in the area. All in all, 30,000 new inhabitants are expected by 2020 on the 738 hectares of the urban area covered in the programme, joining the 20,000 already living there (Bordeaux Euratlantique, 2013). Like the Bassin area, the station area was to a large extent dedicated to industrial and supply chain activities, including the national train companies and the national post company, but most of the land has gradually been transformed into brownfield or oversized stores. Like the Bassin and Bacalan to the North, the train station and its surrounding area is expected to become an extension of the Bordeaux city to the South.

The Euratlantique programme consists of numerous sub-projects which involve retrofitting the existing infrastructure and districts (including large brownfield areas) and the construction of new ones to become an integral part of Bordeaux Metropolis urban area. This involves sharing a similar vision with the rest of the city: buildings and urban projects were designed to be sustainable and lively, and follow a method of public participation and political consensus.

According to Vincent Feltesse, President of Bordeaux Euratlantique, in addition to creating urban projects consistent with the rest of the city, the station area is expected to become the business centre of the city, to receive head offices of existing companies (especially services and financial services), attract startups and stimulate business creation (Bordeaux Euratlantique, 2011). Close to the station alone, this will involve around 300,000 square meters of new office space. One example of this programme is the future Digital City (Cité Numérique). Well established companies as well as start-ups working on innovations in a wide range of areas (3D, web services and marketing, e-healthcare) are invited to join the renovated, up-to-date, 27,000 m<sup>2</sup> grounds of the old postal sorting centre.

<http://www.bordeaux-euratlantique.fr/>

### Bastide Niel-Darwin

Historically, the right bank of the Garonne has been much more working class and industrial compared with the historical city it faces. Reintegrating and extending the city to this bank is a major objective of the Bordeaux 2030 plan (Bordeaux city, 2013).

One of the interesting projects that has germinated in this process is the Darwin incubator, situated at the heart of Bastide Niel District. Since 2012, it has hosted projects and businesses

promoting an alternative and sustainable economy on its 20,000 square meters. Originally a military storage barrack, the site was abandoned by the military in 2005. It then became the host for squatters, dealers and street artists. The original intention of the local authority in 2005 was to destroy the site, but an alliance formed between local associations of residents and a recently established company – Evolution – aimed at accelerating sustainable development projects, defended the site and the old military barracks and bought it from the city. Finally, the Evolution company renovated the site with the support of the Bordeaux city.

After 6 years, about 50 'green and creative' companies became 'Darwinians' (members of Darwin), governing the Niel barracks community collectively. Beyond business incubation as such, Darwin has created an eco-system reflecting and experimenting with new environmentally friendly ideas and concepts for a new way of life, encouraging actors to cooperate, share, help and support one another. This includes experiments on the site itself such as natural air conditioning, innovative waste management, organic shops, cafés and restaurants, but also co-working facilities for some 350 employees working onsite. A number of initiatives have also been launched with local associations, alternative economic activities such as sharing, urban agriculture, urban culture and street art, cycle maintenance courses and tools. Darwin soon became a place of experimentation with a reputation in France and beyond. It welcomes some 700,000 visitors annually.

[www.darwin-ecosysteme.fr/](http://www.darwin-ecosysteme.fr/)



Figure 1: Map of the future Bordeaux (Source: Bordeaux city, [www.bordeaux2030.fr](http://www.bordeaux2030.fr))

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## LILLE

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## Introduction

Lille Metropolis is situated in the North of France, on the border with Belgium. It is one of the largest urban areas in France (after Paris and Lyon) with 1,120,000 inhabitants (in 2012) spread over 611.5 km<sup>2</sup>, and has the ambition to become a gateway to Europe, and an attractive place figuring among the leaders of innovation and smart and sustainable development.

Lille was one of the leading economic regions during the first industrial revolution (Textile, mining, printing notably). As such, it has been significantly affected by globalization, and has had to convert most of its capabilities into new industries and technologies. SMART CITIES initiatives participate in this effort to turn towards the future and develop novel capabilities.

Being within 35 minutes travel from Brussels, 1h10 min travel from Paris and 1h20min travel from London, Lille positions itself as a deeply European and international city, being anchored in the centre of Europe. At the same time, Lille aims at developing close connections with its citizens and collaboration in terms of urban projects aimed at economic development of the region, innovation, sustainable development and environmental preservation.

Smart and eco initiatives have been carried out in Lille for a number of years already. Due to its long industrial past – which involved heavy polluting industries – sustainable development and eco-friendly models of development make a lot of sense in this area. Smart and digital projects have been developed in the past. In 2014, Lille received a ‘French Tech’ national label bestowed on the cities that are leaders in projects on the digital economy and innovations.

Important infrastructures have been created and renovated in the process. These include the modernization of the existing transport infrastructure, for example complete modernization of the 1<sup>st</sup> metro line, which has been in service for 30 years; installation of over 2,000 km of optic fibre in 518,000 buildings; retrofitting of the existing districts with the construction of new sites and redevelopment of existing sites; construction of new buildings compliant with new eco standards and the conversion of old buildings in accordance with new standards.

## Key Projects

### Digital Metropolis

The project is based on high speed internet deployment (digital network) in the Lille metropolitan area, with the aim of 99% coverage of the population (in comparison with 70% now) by 2020. Within the framework of this project, Lille Metropolis Council is hoping to enhance and promote digital services in the following spheres: entrepreneurial activities, home working, innovation,



educational services (distant learning programs, e-libraries, etc.), digital health services, travel applications (promoting tourism) and e-administration services.

High speed connection is expected to boost the emergence of new digital services. In addition, the metropolis intends to give all citizen access to this high connection capacity. Led by the Department of Economic Development of Lille Metropolis in partnership with different telecoms providers, the program started in 2011, with completion planned for 2020. The project combines public and private funding. As of now, the installation of the networks has already started in a number of areas.

The impulse to the project was provided at the national level: a National Program for High Speed Internet Connection (2010-2025) was launched by President Holland's government and further extended by President Macron in relation to the main telecom operators in the country.

<http://www.lillemetropole.fr/mel/decouverte/grands-projets/la-metropole-numerique.html>

### EuraTechnologies

An integral part of the smart city initiatives in Lille Metropolis is this new multifunctional business incubator. Situated on the 100 hectares of the disused textile manufacturer, it has the potential to accommodate 150,000 m<sup>2</sup> of office space (enough to accommodate 5,000 employees) and 170,000 m<sup>2</sup> of residential space. Additionally, it offers incubation and acceleration programs for startups. EuraTechnologies also offers a number of classical services and facilities such as Global Internet exchange facilities, videoconferencing, a digital studio, and recreational facilities.

The aim of the project is to boost innovation by stimulating the creation and accompanying the growth of startup companies, but also promote encounters and partnership between different actors involved in ICT.

Opened in 2009, the centre currently hosts about 100 companies, has accompanied about 300 companies, representing some 4,000 people. Projects have blossomed accordingly in areas such as smart water management, smart grids, digital services.

Funding came from the State, the EU, the Regional Council, the General Council of the Nord, Lille Metropolis and Lille City. Among its other partners are a public real estate developer, the regional digital media hub and the Centre for Innovation in Contactless Technology. EuraTechnologies established strategic partnership with similar centres in the USA, Great Britain, Spain, Belgium, China, Brazil and Dubai.

<http://www.euratechnologies.com/>

### Plan Climat

Like many other French cities, Lille is participating in this national project. The main transitional aims of the project are a 30% reduction of greenhouse gas emissions by 2020, a 10% reduction



in energy consumption and a fivefold increase in energy consumption from renewable sources. Lille's Plan Climat defines 9 main objectives:

1. Stimulate energy transition. The current plan concentrates on the heating networks.
2. Develop the strategy of adaptation to climate change. Establishment of 270 hectares of green zones are planned by 2020.
3. Reduce air pollution.
4. Introduce a flexi-time management system in order to have more people working at different times and also having university lectures at different times and more home working.
5. Strengthen the climate-energy-air balance issues on the city development level.
6. Promote sustainable mobility. Investment of 475 million Euros into modernization of the metro lines with encouragement for cycling and walking within the city. Creation of the carpool service.
7. Promote sustainable construction and renovation.
8. Promote sustainable production and consumption as well as territorial competitiveness.
9. Involve a wider range of participants in environmental issues.

A number of projects, both new build and retrofit, as well as projects specific to a certain infrastructure are currently being carried out. The amounts invested in this project are specific to each initiative. This project is carried out on the metropolitan scale. The current plan was adopted by Lille Metropolis in 2012.

<http://planclimat.lillemetropole.fr/>

### Eco-quartier Rives de la Haute-Deule

Started in 2009 with the opening of EuraTechnologies centre, the project lies within the framework of the national program "City of Tomorrow" (Ville de Demain). Renovation and reintegration of polluted industrial quarters is a major issue here, considering the history of the area, and is expected to be achieved through the development of innovative and sustainable solutions.

A mix of private accommodation and office buildings have been developed on disused industrial grounds, alternative types of transport are promoted in the district (bicycle stations, metro, carpool services, river transport), together with smart water management solutions (rainwater collection redevelopment of the water station) and the promotion of renewable energy sources (instalment of solar panels).

The initiative, based on brownfield sites, consisted of a variety of new build and retrofit development, accompanied with relevant eco-oriented infrastructure (25 hectares). It integrated a number of local government political agendas and perspectives on sustainable development (Agenda 21 Lille, Metropolis strategic agenda). The project budget ran to an estimated €15m euros funded by the French Government. After 10 years, the project has become a well-known point of reference in France, and obtained the Eco-district label from the French State in 2013. In 2017, Lille Metropolis decided to extend this programme to an additional 13 hectares.

Below is a layout of the Eco-quartier Rives de la Haute-Deule, the biggest construction site in Lille at the moment.



Figure 2: Eco-quartier Rives de la Haute-Deule, in Lille  
(Source: <http://www.germeetjam.com/projet-urbain-rives-haute-deule-826>)

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## LYON

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### Introduction

Lyon, situated in the South-East of France, is the second largest metropolis in the country, with a population of 1,321,434 (as of 2012) over a territory of 516 km<sup>2</sup> ([www.insee.fr](http://www.insee.fr)). It has a 2,000-year history that is visible in the city centre (listed as a World Heritage site by UNESCO) as well as a cultural richness. The metropolis also enjoys rich industrial and business traditions in textile and chemistry, as well as a history of international trade, and is certainly the most important industrial cluster in France beyond Paris. One of the main industries in Lyon is the oil industry, situated along the Rhone valley and traditionally called the “chemical corridor” (couloir de la chimie). Among others, its pharmaceutical and biotechnology, transport and supply chain, as well as image industries are also well developed. Lyon is also a leading French city in terms of scientific research and higher education. At the same time, it is an attractive European tourist destination.



Figure 3: Old City of Lyon and the Rhône river,  
(Photograph by LUR-FNASSEM, <http://www.patrimoine-environnement.fr/>)

Lyon is certainly one of the most advanced in terms of smart-eco city experiments in France. It is committed to designing and building a city for the future. It has implemented a series of both smart and eco initiatives, the touchstone of which is the 21<sup>st</sup>-century Lyon Confluence demonstrator district situated in the city centre at the junction of the two rivers (the Rhône and the Saône meet in Lyon). The demonstration involves a structuring partnership with Japanese Energy Agency NEDO to experiment with novel energy management and network solutions (Grand Lyon (2013), the development of IT and open data services including e-government, combining different soft transports (bicycle, e-cars, etc).

Since some projects have been running for over 5 years, results are already visible. Initiatives are carried out at the city/metropolis level. Lyon participates in many projects on the European level. There is a strong participation of large companies. The projects have been broken down into the following categories: Smart Mobility, Smart Services, Smart Energy and Innovation.

As Antoine Picon observed, the multiplication of projects makes it somehow difficult to follow the overall plan: *'the digital strategy displayed by a city like Lyon mixes very different registers, favouring energy transition, offering new mobility solutions, helping business creation, without most obvious links between them'* (Picon 2016, 16).

### Key Projects

#### The Confluence District

Situated in the heart of Lyon, between the Rhone and Saone rivers, on 150 hectares, this is an ambitious project to double the city centre in accordance with the Plan Climat. It entails the construction of new buildings and the reconstruction of existing ones in accordance with the requirements of energy efficiency and sustainability. This is the first district in France to receive the sustainable neighbourhood label from the WWF in 2010. The construction of this district started in 2003. Since then, a number of buildings have already been opened, the construction of the bridge connecting Confluence with the other districts of Lyon has finished and the new tramway line has started working.

At the moment, the population of this district is 10,000 inhabitants and is estimated to reach 16,000 by 2025. The project involves both greenfield and brownfield construction, as well as the retrofitting of existing infrastructure. The project Lyon Smart Community operates within this district. Many different funding and projects were carried out within the framework of this demonstration district. Between 2003-2018, an estimated €1bn has been invested.

A great amount of new infrastructure has been already put in place and is under construction: new buildings compliant with the eco standards and conversion of old buildings in accordance with new standards, new tramway lines, new cycling lines in order to promote alternative types of transport, as well as smart sensors and grids and traffic sensors embedded in roads and water sensors in pipes.

<http://www.lyon-confluence.fr/>





Figure 4: The Lyon Confluence Regeneration Project

(Source: <http://eco-quartiers.fr/#!/fr/espace-infos/etudes-de-cas/lyon-confluence-13/>)

## Lyon Smart Community

The city of Lyon has called on NEDO, the Japanese Urban Development Agency, Toshiba and the great architect Kengo Kuma, to help conceive smarter buildings and infrastructure, conducive to better management of energy and urban traffic, and more generally of the urban flows. These are expected to act as prototypes, that if successful, could be extended to other areas of the city. The demonstration took place in the confluence district (Grand Lyon, 2017).

The Lyon Smart Community (LSC) project, started in 2012, is led by Toshiba on the Japanese side, Bouygues real estate, and by Veolia Transdev and Grand Lyon Habitat on the French side (Toshiba 2014). The main objectives of this project are to create in the Confluence district of Lyon an exemplary smart city area which is energy efficient and managed by the most modern ICT technology. In order to achieve these goals, the project is based on 4 main pillars:

1. Construction of 3 smart buildings of 12,500 m<sup>2</sup> (Hikari project) with passive energy, and a mixed area made up of housing and offices, associated with a smart grid system.
2. Entry into service of the electric carpool fleet charged by photovoltaic panels installed in the district (Project SUNMOOV).
3. Installation of the energy consumption monitoring system. There is an android application designed for the inhabitants of the district (ConsoTab project). Within the framework of this experimental program, 206 homes were equipped by Toshiba with digital tablets monitoring their energy consumption. The aim is to decrease energy consumption to 80 kWh/m<sup>2</sup> (instead of current 290 kWh/m<sup>2</sup>).

4. Development of the system for monitoring and management of energy consumption in the district. This system will allow the collection of all energy consumption data for further optimisation. (Community Management System project). The task of this system is to accumulate all the data collected from Hikari smart buildings, electric vehicles and through ConsoTabs.

<https://www.grandlyon.com/projets/lyon-smart-community-confluence.html>

### Optimod'Lyon

This 3-year project was launched in 2012. Implemented by the Lyon City Council and Lyon metropolis in partnership with such big companies as Renault Trucks, IBM, Orange, and CityWay, it had a budget of €7m. The main objective of this project was the creation of an integrated urban mobility platform, working in real time, with a wide coverage area, traffic prediction mode, accessible by both companies and individuals. The application for Android smart phones has been implemented, giving its users detailed information about alternative transport facilities. The navigator developed by Renault Trucks allows drivers to choose the optimal delivery route, based on real-time traffic information. The route optimisation module developed by IBM allows logistics companies to better organise their services. As a result of this project, 15 databases have been created, 13 real-time traffic flow databases, 20 million mobile data units are processed each day by the Grand Lyon database platform, 200 kms of road are covered with 1 hour traffic prediction sensors, 400 kms of roads are being monitored in real-time mode, €10m of profit have been made, and the annual reduction of CO<sub>2</sub> emissions is estimated at 3,200 tons.

Opticities is a European project led by Lyon metropolis in a consortium with 5 other European cities (Birmingham, Goteborg, Turin, Madrid and Wroclaw). This 3-year project was launched in 2013. It allows Lyon to extend the work started within the Optimod project in terms of further integration of the multi-modal information devices. The main objectives are to normalize the work of the system and to harmonize the functioning of the multimode navigator systems in the cities participating in the project, continue the services of information exchange between the cars and their smartphone navigators (integration of the Optimod navigation systems into the base GPS systems of the main car producers), further integrate the traffic prediction sensors, and develop together with Renault Trucks the navigators for transport companies.

<http://www.optimodlyon.com/fr>

<http://www.opticities.com/>

### TUBA

TUBA is an urban laboratory and an incubator for innovative projects coming from citizens, start-uppers or companies. TUBA is a community and a place where different actors collaborate to design new projects for urban living, and a living lab where they can test innovative products and services in an open innovation philosophy.



## SMART-ECO CITIES IN FRANCE

TUBA is managed by an association called Lyon Urban Data and federates 40 public and private actors. It offers creative spaces, and co-working areas but also innovation challenges, crowdsourcing, workshop, and training. In March 2016, Lyon metropolis received from the European Fund of Regional Economic Development (in the Rhone-Alpes region) funding for the development of the open experimentation platform for innovative projects.

<http://www.tuba-lyon.com/>

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## NICE

Authors: Anna Bond and Eric Jolivet, CRM-CNRS

### Introduction

Nice is situated on the 'Azur Coast', on the Mediterranean coast of France, which makes it a long-standing tourist destination. The population of the Metropolis reached 537,769 in 2012, spread over a large territory of 1,465.8 km<sup>2</sup> (INSEE). Nice possesses the third most important international airport in France.

Beyond its very attractive climate, landscape and cultural heritage, Nice is also a frontrunner in Information and Communication Technologies. The first French cluster was created there in 1969, after the Silicon Valley model, to stimulate collaborations between public and private research and industrial companies in this domain. Today, more than 1,000 labs and companies are gathered in this cluster called 'Sophia Antipolis'. They are mainly active in the field of telecommunications, internet, and multimedia.

Not surprisingly, Nice was also a pioneer city in France to experiment with 'Digital City' initiatives and has established cooperative relations with large international ICT companies, such as INTEL, IBM and CISCO, and has stimulated the creation of startup firms for user-centred applications. It has logically moved towards a 'Smart City' strategy since 2008, one of the challenges being to address the sustainable and eco-friendly side of urban development. As M. Estrosi, the city Mayor states: 'Nice is betting on innovation, digital technologies and industries' to do so (La Tribune 2018).



Figure 5: Nice (Photograph: bogitw – CCO Creative Commons)

The city attracted much attention from large international solution companies (it was ranked first in the IBM Smarter City Challenge 2011, and ranked as the 4<sup>th</sup> most connected city in the world by Juniper Research in 2015), from the European Union (identified one of the top ten innovative cities in Europe at the European web summit, as well as classified as among the 'smart city & communities of Europe'), and from the French Government (awarded the 'French Tech label' in 2015, 'Ville de demain' and 'Plan Climat' funding schemes). It received several distinctions and collected several million euros of prizes and funds (Chodorge 2018, La Tribune 2018). Compared with other experiences, Nice represents a case of a technology- and innovation-driven smart city with a significant emphasis on ICT.

### Key Projects

#### Eco-Vallée Plaine du Var

Started in 2012, the project lies within the framework of the National Interest Operation EcoVallée (a preserved area of 10,000 hectares to create and experiment with sustainable innovations and solutions).

Various projects and initiatives are encouraged and supported, including energy autonomy, improved natural resource management, nature preservation, and smart waste management. They involve both new build and retrofitting, as well as projects specific to certain infrastructure. The main actors involved are Nice Metropolis in partnership with IBM, Orange, CISCO, EDF, GDF Suez, Veolia and Cogedim (real estate). The programme attracted funds from the French State and private companies for an estimated budget of about 2,5 billion euros over a 30 years period.

<http://www.ecovallee-cotedazur.com/>

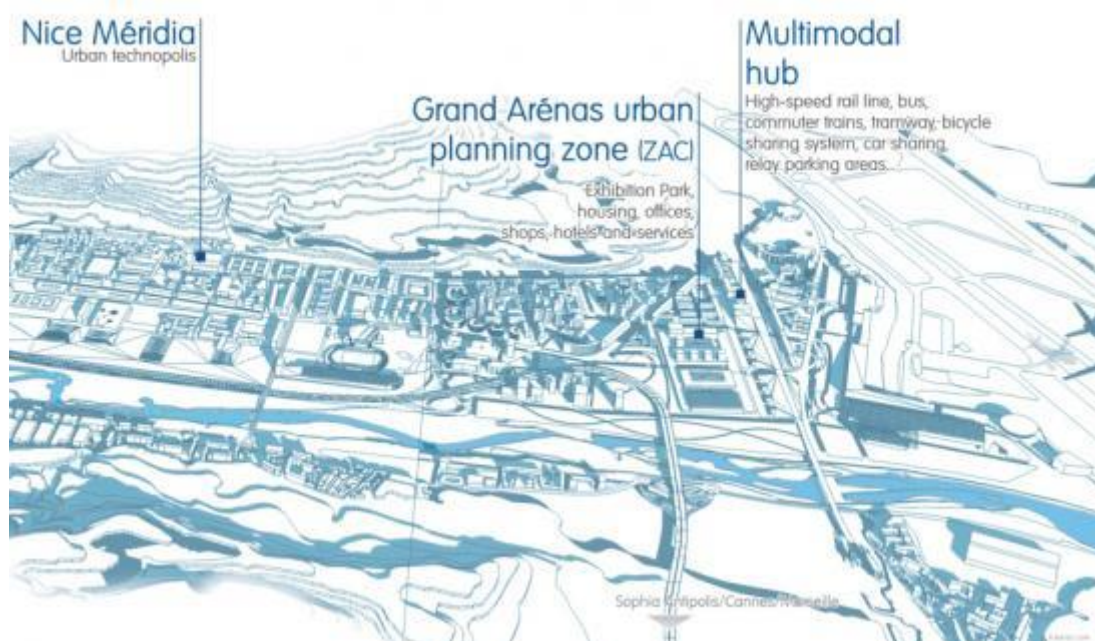


Figure 6: Eco-vallée Plaine du Var and its 4 main projects  
(Source : <http://www.ecovallee-cotedazur.com/projects>)

### NICE MERIDIA/ Smart City Innovation Centre

The Smart City Innovation Centre is an original collaborative technology hub gathering large industrial companies, higher education and research and local authorities. It is defined as a lab where new smart city projects and initiatives are conceived and developed, before being implemented in Nice and beyond. It is acting as a coordination and expert body for the smart cities initiatives to be launched in the metropolis.

The first Smart City Innovation Centre demonstrator was a 300m<sup>2</sup> showroom opened in February 2015 (the next stage involved extending it to 500 m<sup>2</sup>). Situated on the premises of the Mediterranean Institute for Environmental Risk and Sustainable Development. The main actors in this project are Sophia-Antipolis University of Nice, Nice Cote d'Azur Metropolis, large corporations (Veolia, IBM, Orange).

<http://univ-cotedazur.fr/fr/index/centres-reference/plateformes/smart-city-innovation-center>

The Smart City Innovation Centre is the prefiguration, a small-scale prototype, of the larger scale urban technopolis project called Nice Meridia, now under construction (26 hectares, 2,000 houses, 4,000 jobs). Nice Meridia is conceived as a science park dedicated to sustainable development issues and technology development.

<http://www.ecovallee-plaineduvar.fr/les-projets/nice-meridia>

### Urban Monitoring Environment

One exemplary initiative is the urban environment monitoring (MUE). It aims at measuring different 'quality of life' variables such as air pollution, car traffic, noise, water & waste management to better generate data and enhance the creation of solutions and services to act upon them through its different dimensions.

Around 3,000 sensors have been installed on 160 h, on different urban appliances (street lamps, garbage collection units, etc), in different buildings (both public and private), on six electric cars belonging to the Metropolis and in specially equipped cabins. Different types of sensors are gathering information on noise and air pollution, traffic, quality of the air inside the buildings, fill rates of garbage collection units, leakage rates for potable water as well as the quality of potable water, water consumption of the irrigation systems, energy consumption in the buildings, energy consumption by public lighting, and biodiversity. One demonstration-oriented so-called 'connected boulevard' has been established with Cisco Systems to measure different dimensions of the urban environment.

The aim of the project is to improve the quality of life in the city through: (a) economizing on energy consumption; (b) improving public infrastructure maintenance; (c) reducing CO<sub>2</sub>, noise and air pollution rates in the public areas; (d) establishing better control and faster intervention into the water supply infrastructure; (e) optimizing garbage collection services; and (f) increasing citizen involvement in adopting eco-friendly behaviours.



Big data collected are centralized in a new-generation dedicated data centre with real time vision and access. It allows participating companies to develop and test new services starting from 2017. This project operates in 3 districts of the city. It is set up by Nice Metropolis in partnership with the consortium of VEOLIA, ORANGE, M2OCITY and IBM. Funding has been shared between local authorities and private companies.

<http://unice.fr/imredd/plateforme-technologique/environnement/monitoring-urbain-environnemental>

### Nice Smart Grid

The Nice smart-grid project started in 2012, under the leadership of ERDF (the French national energy network company). It is based upon an experimental suburban location (in Carros) which attempts to make the most of photo-voltaic power generation, battery storage facilities, smart metering and electricity client inter-action in order to generate and use electricity in an efficient fashion. This is the first example of a smart solar energy district in France.

Beyond the classical objectives of CO<sub>2</sub> emissions and renewable energy sourcing, one interesting aspect of the project has been the monitoring and management of energy at a district level. Within this project, 200 homes were equipped with Linky smart sensors, the equivalent of 2-3 MW capacity. Sensors have been installed in private homes and in companies to survey behaviours.

<http://www.nicegrid.fr/>

### Nice Smart Valley

A follow-up and scale-up project is the European Project Interflex. Launched in 2017, Interflex brings together the competences of Swedish, Dutch, German and Czech industrial actors to experiment with new and smarter forms of energy distribution. The goal is to test new and flexible solutions to optimize local energy networks.

In Nice, the demonstrator is building on the Carros experiment (Nice Smart Grid). Tests will be performed on autonomous and shared energy storage systems, interoperability between renewable electricity and other forms of energy, a cooperative management platform shared between different energy suppliers/ operators, and a platform to improve public energy consumption monitoring and management. Experiments will also involve testing different solutions for different types of territory: urban, peri-urban, but also isolated, mountain or islands ones.

<http://nice-smartvalley.com/gb/>

### IRIS Project

The IRIS project promotes the diffusion of integrated smart solutions in the fields of energy, mobility (real time monitoring and management of building and houses energy consumption, an electric vehicle energy reload network, car sharing, new local energy sources, sensors, etc) between three advanced cities in Europe: Nice, Utrecht and Gothenburg. Experiments and sharing of demonstrated solution and data is on the menu of the first stage of the project. The second stage will involve sharing tested solutions with 4 other European cities (Vaasa, Alexandroupolis, Focsni, and Santa Cruz de Tenerife). Nice obtained €4m of funding to perform the experiment and sharing until 2022.

<http://univ-cotedazur.fr/archives/fr/idex-uca-jedi/centres-reference/projets/projets-h2020/iris>



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## TOULOUSE

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## Introduction

Situated in the South-West of France, Toulouse is the fourth largest metropolis in the country. It has a population of 734,944 (in 2013) and stretches over a territory of 458.2 km<sup>2</sup> ([www.insee.fr](http://www.insee.fr)). Toulouse is the fastest-growing city in France in terms of population (3.6% between 2006 and 2012).

Among the main industries contributing to the Toulouse economy are: aeronautics, space, electronics, information technology, and biotechnology. Toulouse is the home of the AIRBUS headquarters and Intel European headquarters. CNES Toulouse Space Centre is the largest space centre in Europe. Technological innovation and scientific research have long featured among the city's strengths and the vision of Toulouse emerging as a 'smart' city strongly relies on these pillars.



Figure 7: Capitole of Toulouse, and the square of the same name with the Occitan cross designed by Raymond Moretti on the ground.

(Photograph by Benh Lieu Song via Wikimedia Commons:

[https://commons.wikimedia.org/wiki/File:Toulouse\\_Capitole\\_Night\\_Wikimedia\\_Commons.jpg](https://commons.wikimedia.org/wiki/File:Toulouse_Capitole_Night_Wikimedia_Commons.jpg))

Toulouse positions itself as an 'Open' city: aspiring to a digital eco-system targeted at the preservation of the environment and dedicated to its people. Toulouse Metropolis envisions itself

as a people-centred city. In this sense, smart technologies must be at the service of Toulouse's citizens.

The recent strategy of metropolitan development in Toulouse is based upon following main axes:

- a) institutional reinforcement and closer cooperation between different districts of the city with the city's smartness focused around the centres of scientific research and technological innovation;
- b) the social inclusiveness of the urban projects, whereby the city authorities are keen on establishing an enduring dialogue with its citizens.

The city's rapid urban and demographic growth during the past three decades brings with it the necessity to transform the city accordingly. As a result, mobility and public transport has become one of the main issues of metropolitan policy in order to avoid wide traffic congestion in the city and improve the ecological situation. Among the main urban initiatives in this area are: construction of the third metro line, which will connect the main train station with the airport; the creation of new fast bus lines (Lineo); modernization and expansion of the existing transport infrastructure (Boulevard Urbain Nord project); and the installation of congestion sensors.

The expected arrival in 2024 of a Bullet train line (LGV) Paris-Bordeaux-Toulouse, which is estimated to bring 18 million passengers per year, would, if it was confirmed, trigger the reconstruction of the district surrounding the train station - Toulouse EuroSudOuest, which would then become a major transport platform for the city. This project is however fairly uncertain at this date, notably because it is heavily dependent on Governmental support.

By promoting Toulouse an 'Open' Metropole (in fact some city representatives prefer this slogan to 'Smart'), city authorities have embarked on a policy of wide public participation in urban initiatives. Numerous workshops have been organized for the general public as well as certain population groups and professionals. Toulouse Metropole extensively promotes start-ups, supports the establishment of a number of Living and use Labs, start-up incubators and accelerators, the aim being to adapt technology to the local needs of citizen. In 2014, Toulouse received the 'French Tech' national label, bestowed on the cities that have taken the lead in start-up projects in the digital economy. The new city authorities, elected in 2008, established a strategic approach to the metropolitan development of Toulouse. This strategy relies on public participation and that is to the great extent reflected in different urban projects. One of the main projects implemented in Toulouse at present is a Smart City master plan which gathers under its umbrella a number of urban initiatives.

It must be mentioned that it is still very early for measuring the success or failure of Toulouse initiatives since the majority of the projects are very recent. The project according to a representative from Toulouse Council the 'Smart City' has started from a "blank page".

### Key projects

#### Smart City plan 2015-2020: Toulouse L'Open Metropole

The aim of the Smart City master plan (Toulouse Metropole 2016) is to transform Toulouse, a fairly dynamic city, along a more sustainable and inclusive path of development. Technology advances will be adapted in order to facilitate everyday life and make public services more efficient and to open doors to innovation. The master plan consists of a great number of varied projects at different stages of implementation: they range from small-scale experiments lasting less than a year, to demonstrator initiatives with a consortium of actors, and ongoing global projects. Some of these projects are further detailed in this review. The Smart City Master Plan has 5 overall ambitions, aiming to achieve:

- optimized, simple and fluid mobility
- an adaptable, efficient and breathable metropolis
- an international metropolis anchored in her roots
- a good quality of life for people of different generations
- a beautiful, clean and safe metropolis

So, one could say that the 5-year plan aims both at the software and hardware of the metropolis, including Toulouse and 37 surrounding municipalities between 2015 and 2020.

One of the main principles of this project is public-private partnership. In developing the Smart City master plan in 2015, significant attention was given to consultation with the different representatives of the citizen and private enterprises and public services. In September 2015, three workshops were held. The main subjects of this workshop were smart mobility, smart energy and e-services. The participants of second workshop were focused on the "Silver economy", the main subject being innovative services for elderly people. The participants of the last workshop were the business community. Since June 2015, 17 experiments with innovative startups have taken place: 9 in the domain of e-services, 3 in autonomy (targeted at the elderly and vulnerable) 3 in mobility and 2 in sustainable development.

Supported by the Toulouse City Council and large public companies, the project is designed towards cooperation with the various startups. The emphasis is on building citizen-centred services that will improve the quality of life.

The master plan spreads €500m of investments over 5 years and another potential 200 million from private contributors. Initiatives include: high speed wifi connectivity in the entire city, 'smart lighting' (up to 80% energy consumption reduction), open data platforms, innovative approach to public services, traffic management and improvement of public transport services (new metro and bus lines), and urban environmental control.

Quartier Andromède is one of the most advanced projects within Smart City plan. Situated in the north-west of Toulouse in the proximity of the airport and Airbus headquarters, its construction started 10 years ago. It now has over 5,000 inhabitants and over 4,000 people are working in the district. Those numbers are expected to double upon the completion of the project (which was planned for 2017).

## SMART-ECO CITIES IN FRANCE

Andromède district was the first in Toulouse to be awarded the EcoQuartier label in 2014, a distinction awarded by the French Ministry of Sustainable Development. A living lab has been operating in this district since 2016, and there, people will be able to experiment with some new services, with a special focus on the 'silver economy' (ie with older residents in mind).

Within the framework of the 'Smart City' project, car sharing schemes started operating in May 2016. Citiz, founded in 2002 under the name France-Autopartage, is a private initiative (operating in 80 cities in France). In Toulouse it accounts for 42 vehicles and 1,500 users. It is associated with a mobile application called Coovia, which by collecting data on public transport, availability of public bicycles and car sharing possibilities, enables its users to choose the optimal route and way of travel.

The construction of the 3<sup>rd</sup> metro line connecting two main transport arteries of the city is equally worth mentioning: Toulouse railway station and the international airport will be directly connected. Construction works are due to finish in 2024.

The project is governed by a Supervisory Committee overseeing a Steering Committee comprised of around 15 members, who meet every two months, and a Technical Committee with more than 50 members. Even if the participation of the public and other key stakeholder groups is an important component of the smart city initiatives in Toulouse, many of the projects in the current plan originated in the local authorities of the metropolis.

<http://www.toulouse-metropole.fr/projets/smart-city>

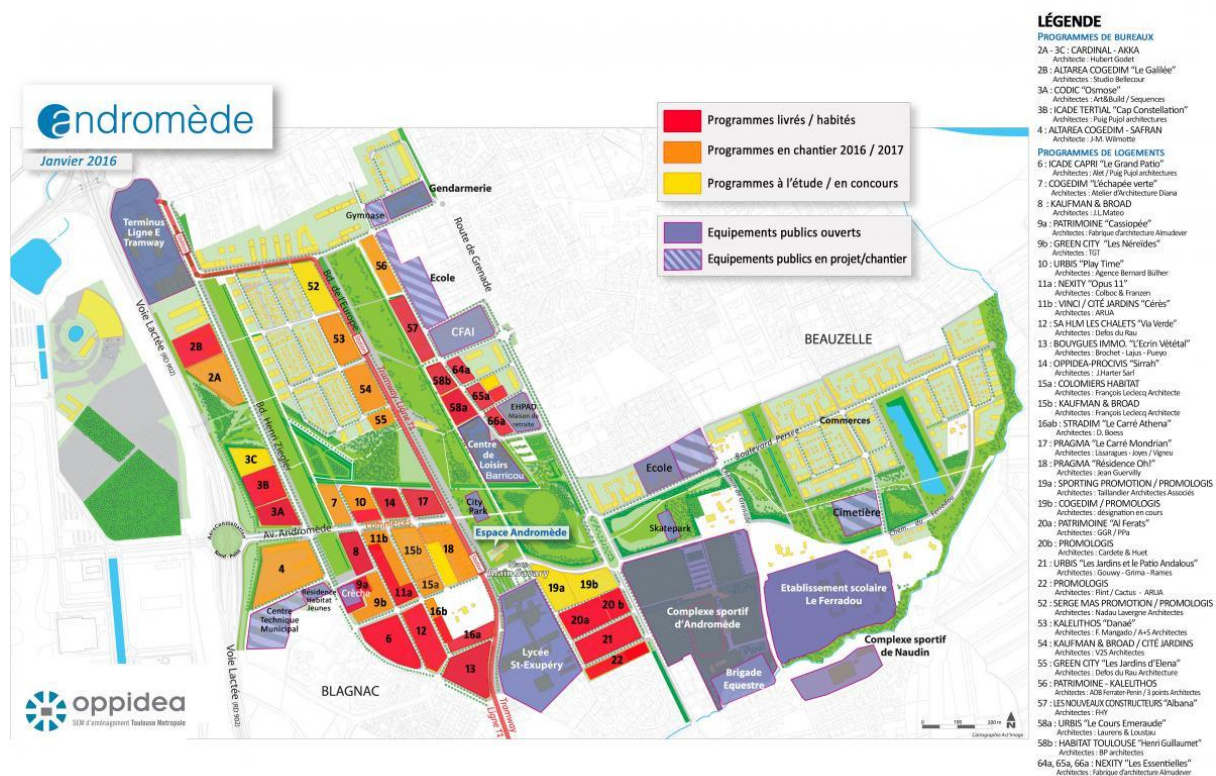


Figure 8: A plan of the Eco-quartier Andromède in Blagnac, North-Eastern suburb of Toulouse  
(Source: [www.oppidea.fr/amenagement/zac-andromede.html](http://www.oppidea.fr/amenagement/zac-andromede.html))



### Plan Climat

This is an eco-project within the framework of the EU collective environmental effort. It aims to achieve 3 main targets by 2020: raising energy efficiency by 20%; a 20% reduction in greenhouse gas emissions; and a target of 20% energy used to come from renewable sources. The city obtained a French national reward for this project promoting sustainability.

The overall action plan contains 130 measures. These measures are incorporated into 7 main transitional targets:

- a) development of renewable energy resources;
- b) development of eco-transport;
- c) promotion of 'eco-solidarity' or helping those of lesser means to be more eco-conscious;
- d) sustainable construction;
- e) adjustment to the growing population and minimising environmental hazards;
- f) preservation of natural resources and agricultural sustainability;
- g) involving a wide range of regional actors in the project.

This project involves the construction of 10 eco-districts (éco-quartiers) to expand the existing urban area, with a mixture of ecologically retrofitting the existing infrastructure and the construction of the eco facilities. Out of 10 planned eco-districts, 6 are already under construction and 2 have received the eco-quartier label.

The main objectives are:

- a) preservation of the air quality;
- b) adaption to climate change;
- c) transition in energy production towards greener resources.

The project started in to 2012 and will continue until 2020.

<http://www.toulouse-metropole.fr/missions/developpement-durable/plan-climat>

### Cantine Numérique

The concept of 'digital cantina' first appeared in the United States (more precisely in Silicon Valley) then subsequently spread to Europe, first to Great Britain and then to continental Europe. Cantine Numérique was opened in Toulouse in January 2011 by the local branch of La Mêlée (an organisation promoting the digital economy). The idea behind Cantine Numérique was to create an open digital environment and co-working space for different player and project leaders in ICT industry.

Three main types of actors are involved in the functioning of Cantine Numérique in Toulouse: public actors (Regional, Metropolitan, City-level and Universities), private actors (companies and project leaders), and partnership organisations (trade associations, clusters, business accelerators, etc.).

The Cantine offers three types of space:

- a paid-access closed-in section for coworking;
- an open-access "lounge"-for holding meetings;
- other spaces that can be used (depending on their availability) by co-workers for various purposes.

During this period of time, Cantine Numérique has provided the equivalent of 1,210 coworking days, hosted 7,380 participants of various events (272 events were organised during this period of time) and hosted 17 different web communities.

### Boulevard Urbain Nord

This is a transport-specific project, which involves the development of the urban area in the north of Toulouse alongside improvements of the existing transport infrastructure, including the construction of new car lanes as well as rapid bus transit lanes. It also takes into consideration the environmental challenges of the congested city, aiming to preserve natural landscapes, support alternative water management facilities, and reduce environmental risks.

The project, which is government funded, started in 2013 and has a completion date of 2025. So far, the first part of the car lane has been opened. €6m Euros have been spent so far, from a budget of €47.8m for 2016.

<http://www.toulouse-metropole.fr/projets/boulevard-urbain-nord>

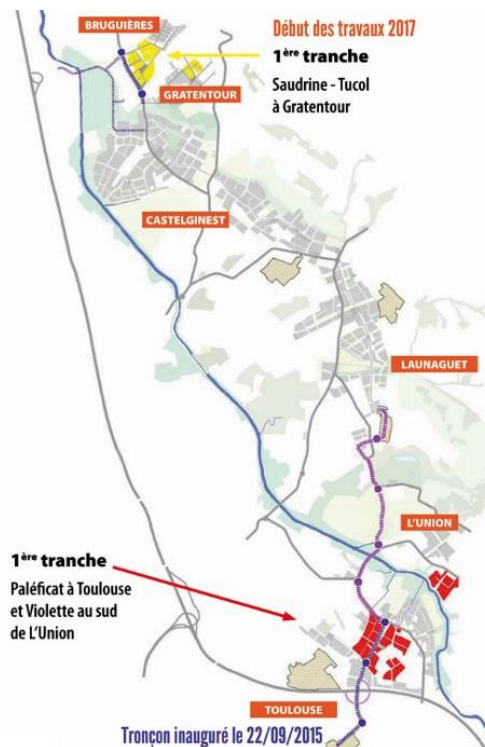


Figure 9: Planned transport development in the North of Toulouse. Boulevard Urbain Nord  
(Source: [www.mairie-bruguieres.fr](http://www.mairie-bruguieres.fr))



## Toulouse EuroSudOuest

This is a retrofit of the existing urban area around the train station. The project is related to the possible opening of a bullet-train line (LGV) connecting Toulouse to Paris and Bordeaux in 2024. The development is centred around the creation of a multimodal transport hub, with all types of transport at hand: train, metro, bus, car, cycling and footpaths. It also entails the construction and redevelopment of private and commercial buildings. The initial investment of this project is €5.5m, coming from the State, the Midi-Pyrénées regional authorities, Toulouse Metropolis and Haute-Garonne county. It should be noted, however, the establishment of the new fast train lane is still surrounded by a lot of uncertainty.



Figure 10: Planned development of the train station area, Toulouse EuroSudOuest  
(Source: [www.toulouse-eurosudouest.eu](http://www.toulouse-eurosudouest.eu))

## Montaudran Aérospace

This is a brownfield project involving the construction of a new eco-district with a university campus, research institutions, innovation companies and a residential area on the historical grounds of the civil aeronautics site. The aim of this project is to establish a scientific district dedicated to aeronautics and space.

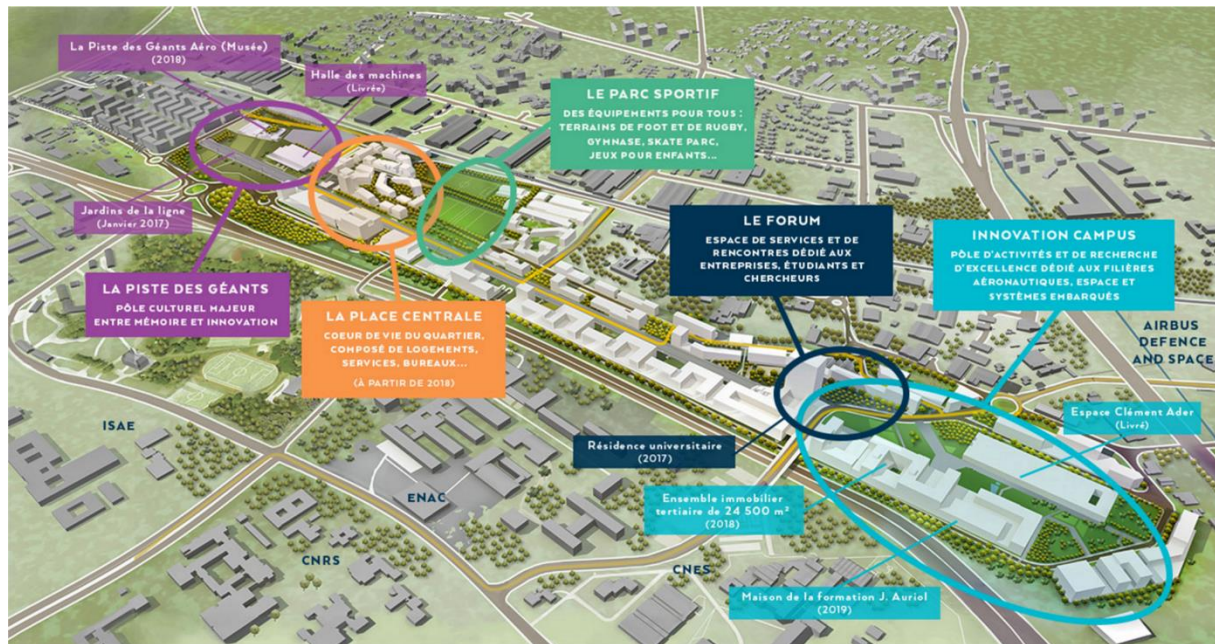


Figure 11: A plan of the Toulouse Aérospatial éco-district  
(Source: <http://www.toulouseaerospace.com>)

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## CONCLUSION

The French landscape of smart-eco cities is still in its infancy. At the time of this survey, no dedicated national scheme or central framework had been set by the Government to promote it. As a result, our study revealed that about thirty cities had taken initiatives to transform themselves into smarter and more sustainable urban areas. Many of these initiatives build on a longer history of urban experimentation within individual cities.

The key word to describe what has been done so far is heterogeneity: we discovered a variety of initiatives and projects, a variety of large and mid-size urban areas, a variety of context and purposes. It would be wrong, however, to think of the French landscape as a series of isolated experimental 'niches'. Increasingly, experiences are shared, technical issues discussed, best practices identified as the actors involved, on the public and on the private side, are sharing their discoveries. In this report, we have tried to make sense of this variety along a few institutional and structural lines.

The focus of this early survey has therefore been to shed light on 'city agency', on the construction of an integrative perspective, and to observe, in this light, the emerging French landscape through a series of 5 selected cases. The local authorities in these five cities have been confronted with important changes in the way inhabitants live in their cities, participate in forging their cities' identity, move from one place to another, work in one place or another, have fun, and in expectations about what an attractive city should look like, and what public goods it should provide. They have responded by conducting a wide and heterogeneous array of experiments using modern science and technology, in varying collaborations with large international companies, high-tech startupper, and local communities.

Because of the multi-dimensionality of the issues at stake and the uncertainty associated with the use of a number of state-of art technologies, and because they are venturing into new territories, these cities decided to organize a learning arrangement, an experimental setting for trial and error, allowing them to test, validate, select, and sometimes adapt, based on what is best suited to their local situation. This goes with a whole new culture of public authority and administration's missions. It is also accompanied by the need to elaborate a political agenda, a collective vision that will work as a guideline for the different actors collaborating. This, in turn, entails the elaboration of new forms of participation and democratic governance. What the 5 selected cases have in common, according to our available information, is city agency, a political agenda, and a vision of the future they would like to build for and with their citizens.

Beyond this common foundation, however, our 5 cases each tell quite different stories. Some of them, like Nice, probably influenced by a long tradition of digital experiments and favourable institutions, tend to rely centrally on technologies, especially ITC, and cooperate intensely with large international technology suppliers to sometimes be the first to explore, the first to test and validate, and to somehow co-create a novel emerging solution to a universal issue such as allocating parking places, or favouring intermodal transportation. This allows for prizes, funds and awards, and a growing international reputation of being an innovative city.



Some others, like Lyon, resolved to restrict their experimental activities to one particular area or district, to observe them, and to test the interactions between different projects, more easily. This is an opportunity, while renovating a forgotten area, to experiment with the urban fabric more closely. How do you build a modern urban area for tomorrow? What are the appropriate infrastructures? What happens if heavy investment in novel technologies is made to simulate possible future organization (something that would be too costly and risky to deploy at the scale of the metropolis)? What is a district going to look like tomorrow? How are the flows of energy, water, waste, information, and also people, going to spread and be managed in a smarter and more sustainable way?

Toulouse and Lille are exploring different alternative paths to deal with different major issues (such as mobility and ageing populations) that they wish to co-construct with their citizens. In these two cities, the emphasis is placed on rethinking the governance system, inventing new forms of public participation – sometimes, we believe, at the cost of a clear and straightforward set of concrete ambitions.

A different story still is presented by the Bordeaux case. Here, the ‘smart’ and ‘eco’ concepts are just two instruments at the service of Bordeaux’s re-invention. Smart-eco initiatives are articulated into a more holistic process of reflection about how to construct the contemporary city. How to prepare it for the future and make it an attractive, integrated city, offering high quality of life, yet still founded on and connected to its historical humanistic values? How to harmoniously combine high technologies and an outstanding cultural and natural heritage?

Each of these stories tells us how city authorities have been intending to create dynamic collective processes of experimenting and learning, attracting and combining funds and resources, appropriating and making sense of advanced technology solutions to adapt them to local uses and expectations, and integrating these solutions into more global and long- term perspectives. This is probably just the beginning, and more comprehensive reports on smart cities in France are going to be published in the near (Eveno et al. 2018) and longer future. Our own observations in the current report should therefore be understood as only a preliminary attempt to make sense of an evolving set of urban tendencies, and we invite others to build on or contest what we have found as this field develops in future.

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