



# Digital for the Smart and Sustainable City

## /// WHY MUST WE ACT FOR A SMART AND SUSTAINABLE CITY?

Digital technology and "Smart City" strategies are widely deployed tools – particularly in Asia, Northern America and Africa – facilitating the urban management of large cities, though they do not always form part of sustainable and inclusive trajectories.

In Europe and France, the sustainable- and smart-city approach is increasingly based on the rational use of digital technology, emphasising the notions of impact and responsibility. It seeks to mobilise these technologies only when the negative external effects caused are offset by measurable gains, in terms of limiting the consumption of natural resources and energy, ensuring the efficiency of systems or promoting the integrated and more economical management of urban services. On the other hand, it considers the social and societal impacts of digital technology, by assessing digital illiteracy and the risks to individual freedoms or democracy as the new global and consequent vulnerabilities of the rapid digitalisation of all urban services.

Put simply, in a world with limited resources, current digital growth is unsustainable: with increased energy consumption (+9% per year) and additional and increasing greenhouse-gas emissions (4% in 2019). Digital technology is therefore both an opportunity (mobilising data to better characterise challenges and develop more systemic responses, optimising the use of existing infrastructure, reinforcing the effectiveness and efficiency of certain urban services, etc.) to accelerate the transition of local areas, but also a challenge and a risk (digital exclusion, international dependence on rare earth elements and materials, cybercrime, lack of recycling and increased environmental pollution, energy mismanagement, etc.).

Digital challenges are simultaneously different and interconnected between developed and developing countries. Today, digital development and consumption largely concern western countries, while Africa, Pakistan, India and Thailand receive 70% of electrical- and electronic-equipment waste, which is either non-recyclable or only somewhat recyclable and exported illegally.

The immediate and diffuse environmental impact of the rare-metal mining required for digital technology and the green transition are creating an additional divide with developing countries. Rare materials represent two issues: the economic, social and environmental price we are willing to pay in order to access them, and the relocation of pollution from developed to developing countries.

There is an urgent need to rethink our relationship with digital technology and redefine smart and sustainable local areas, as proposed by the OECD via "initiatives or approaches that effectively leverage digitalisation to boost citizen well-being and deliver more efficient, sustainable and inclusive urban services and environments as part of a collaborative, multi-stakeholder process".

It is for this reason that France and its national, European and international partners are now working to question uses and target situations in which digital solutions may represent real factors for improving quality of life.

### /// SUFFICIENCY, INCLUSION, RESILIENCE AND CREATIVITY APPLIED TO THE DIGITAL STRATEGY

According to France Ville Durable, a responsible digital strategy with high added value is one based on "just need", demonstrating "techno-discernment", which can be easily derived from the four pillars and fundamentals of sustainable cities and local areas:

Digital **sufficiency**, in order to deploy solutions that respect the planet's physical limits (efficient preservation of resources, responsible data management, etc.) through life-cycle analysis.

**Resilience** faced with an awareness of new vulnerabilities (cyber-attacks, etc.) and various dependencies, including rare earth elements and materials, to better model integrated solutions and anticipate future developments.

Democratic and social **inclusion**, making it possible to reduce the digital divide and digital illiteracy, so as to protect data and freedoms (access to and management of essential health and education services, civic participation, etc.).

**Creativity**, through a metabolic approach to local areas, to promote social and organisational innovation at the service of collective intelligence, as well as human and social progress.

#### WHAT DOES THE LAW SAY?

- The French Anti-Waste and Circular-Economy Law (AGEC): carbon information at the time of purchase, reparability and durability indices, fighting planned obsolescence, etc.
- The French 'Reducing the Environmental Footprint of Digital Technology' Law (REEN): raising awareness among users, limiting the replacement of devices, developing less energy-intensive data centres and networks, etc. in order to reduce the environmental footprint of digital technology in France.

#### The recommendations of the FVD working group for a responsible digital strategy are as follows:

1. Limit new purchases, **promote refurbished technology** and fight the planned obsolescence of equipment.
2. Aim for **transparency and the reduction of life-cycle impacts** for infrastructure, devices and data.
3. **Increase vigilance and "accountability" in the digital** sector with regard to environmental and security issues.
4. **Anticipate the scarcity of access to minerals and rare earth elements** in Europe and internationally, and increase research and development into their recovery and recycling.
5. **Integrate the issues of local and social justice** through vigilance regarding the segregation that may result from the race for technology, on a national, European and global level.

### /// WHAT ARE THE MAIN AREAS FOR DIGITAL INNOVATION IN THE SMART AND SUSTAINABLE CITY?

> **The development of user services** aiming to place the citizen and urban uses at the heart of public policies and stimulate the development of new services through data. These tools make it possible to ensure the best use of the information collected, in order to ensure the management of services, facilitate simulations intended to inform choices, offer inhabitants more efficient services and ensure better protection of the environment.

> **The collection and processing of data** via platforms that make it possible to interconnect information systems of different natures, operating with data formats that are not always compatible, and therefore make these systems interoperable.

> **Strengthening cyber security in order to become more resilient**, securing the information system (network, data, computers and applications), as well as all other local digital infrastructures: connected vehicles, traffic lights, streetlights, sensors, ports, hospitals, etc.

> **The integration of the "low-tech" approach as a systemic approach** refers to sustainable innovation (products or services) that better take into account resource restraints, focusing on low-tech, agile and resilient technologies. These initiatives correspond to the eco-friendly design of web and software; simplified, less energy-intensive and repairable electronic devices; and open-source tools to make digital technology accessible to all.

### **/// WHAT ACTIONS HAVE BEEN IMPLEMENTED IN FRANCE TO SUPPORT THESE INNOVATIONS?**

> **The national strategy for inclusive digital technology** makes it possible to fight the digital divide based on three focuses: equipping and training carers to support the digital empowerment of citizens by offering local training with approved professionals and updating support local governments' support initiatives as they adopt digital technologies.

> **The Ministry of Ecological Transition's digital and environmental roadmap proposes to:** develop resilience for public actions (environmental barometer and mission assessing the environmental impact of digital technology, study on the development of connected objects, etc.), support more sober digital technology (promoting the eco-design of equipment and software, sufficiency of digital services and infrastructure, etc.) and, finally, to innovate, making digital technology a lever for environmental and solidarity transition (putting data and digital innovation at the service of the environment, data transparency, support for GreenTech and low-tech, etc.).

> **The Future Investments Programme (PIA4)** allocates €20 billion over five years as part of the French recovery plan, including €12.5 billion to finance investments in emerging and priority sectors and technologies (digital technologies, digital education, etc.). Digital technology is being integrated into new consultations on topics such as digital health, the digitalisation of mobility, future telecoms networks and more.

> **The set of support schemes for start-ups and SMEs** facilitates the development of technologies and services, a large part of which contributes to the development of smart- and sustainable-city digital platforms. It is also worth mentioning the Ministry of Ecological Transition's GreenTech innovation initiative, calls for projects such as PERFECTO 2021 (ADEME – French Agency for Ecological Transition) or the ECONUM (Recovery Plan).

> **BIM (building information modelling)** forms digital platforms on smaller scales (building, neighbourhood) or themes (energy) than the city as a whole. These represent the subject of firm public-support policies through regulatory mechanisms (BIM).

> **The development of smart grids:** these make it possible to acquire real-time information for all sorts of situations and to monitor flows, on an extremely precise scale. They can also be connected to other networks to complement these functions. As a result, both supply and demand can be managed, while saving energy and making the network more adaptable, thereby generating greater resilience. This applies just as much to mobility as to energy and water consumption and, more generally, to all urban services.

#### **THE SUSTAINABLE CITY BY FRANCE HUB**

**[www.sustainablecitybyfrance.org](http://www.sustainablecitybyfrance.org)**

*> This platform is a gateway to all the relevant content for sustainable city professionals: training courses, methodological guides, tools, specialised sites, standards and labels, etc.*

*> There are also examples of achievements that address the challenges of the regions. The aim is to showcase operational solutions and encourage their deployment in France and internationally.*

***The fact sheets contained in this dossier present a series of achievements with high potential for sufficiency, resilience, inclusion and creativity, for a responsible digital strategy. Work remains to be done to accelerate transition by widely disseminating these good practices.***



## /// THE "ZERO-CARBON AREA" SUPPORT PROJECT FOR THE LA ROCHELLE COMBINED DISTRICT COUNCIL.

**The La Rochelle Combined District Council has embarked on the path towards carbon neutrality through the local "La Rochelle Zero-Carbon Area" project, alongside Suez.**

Their solutions to transform digital technology into a lever serving the local area, by combining better quality of life and performance of urban services, are based on three stages:

**1/Measuring** the impact of digital technology with different tools: calculating greenhouse-gas emissions, analysing the life cycle of digital tools, and the WeNR information-system footprint-measurement tool, a solution based on the qualitative and quantitative analysis of carbon footprint and responsible digital maturity.

**2/Raising awareness among** citizens and all stakeholders of the environmental impact of digital technology through conferences, workshops and interviews.

**3/ Co-constructing** a roadmap with concrete actions to reduce the impact of digital technology.

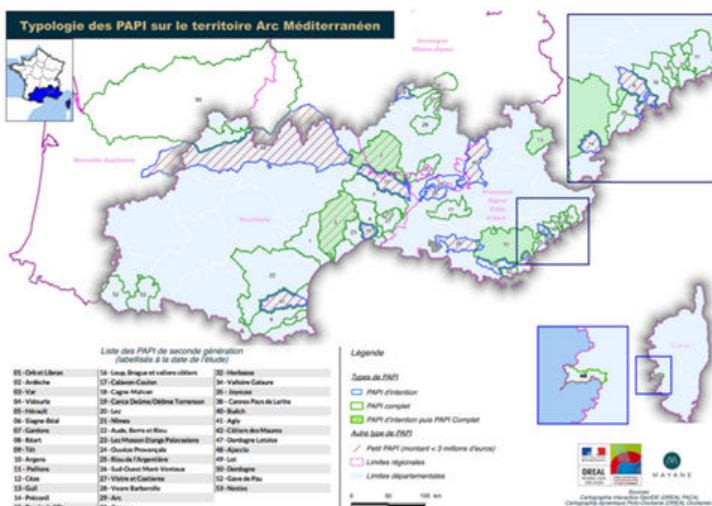


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Find out all the achievements on the SCbF portal:  
<https://sustainablecitybyfrance.org/all-projects/>



## /// DATA ANALYSIS TO IMPROVE FLOOD-PREVENTION ACTION PROGRAMMES (PAPI)



The **Flood-Prevention** Action Programme (PAPI) is an operational tool, developed by Mayane, for **flood risk management in France**. Supported by local governments, it facilitates the capitalisation of public funds to implement actions intended to reduce the vulnerability of local areas to the risk of flooding.

**Huge amounts of information and data collected and analysed across the Mediterranean arc**

> A global analysis grid has been developed with the aim of bringing together all the information from each Flood-Prevention Action Programme and developing the resulting indicators. Ultimately, the information and data collected has helped to develop relevant resilience indicators and the analysis of non-structural actions for flood adaptation.



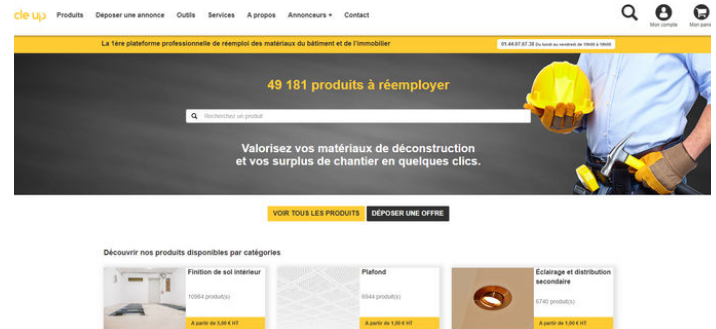
### /// DIGITAL TECHNOLOGY AT THE SERVICE OF THE CIRCULAR ECONOMY:



**The Cycle Up platform, created by Egis and the Icade company, offers open access to identify available materials and their reuse solutions, services, expertise and insurance to develop sustainable and low-carbon real estate.**

> **Benefit:** safety and traceability to enhance the benefits of reuse.

> **Aims:** to optimise the coming together of supply and demand for reuse materials and to connect actors within the sector – owners, project owners, architects, engineers, demolishers and builders.



### Example: the former France Telecom building in Suresnes

In Suresnes (Hauts-de-Seine), the former France Telecom building was transformed into an office building. As part of its reuse assessment before clearing, the Cycle Up platform facilitated the provision of certain reusable materials: lighting, false ceiling, technical floor, etc.

The platform has made it possible to identify the materials that should be carefully removed before clearing and to limit the amount of waste generated by avoiding landfill.

### /// THE METROPOLITAN DATA CHARTER, A MANAGEMENT TOOL IN NANTES



#### Charte métropolitaine de la donnée

Un cadre éthique pour protéger les citoyens et réguler l'utilisation des données sur le territoire



**Data is now produced in large volumes, and for the first time in France, an ethical charter regarding the management of a local government's data has been published in Nantes.**

This applies to all public and private actors working within the framework of its public-service activities and highlights four commitments for the Metropolis: guaranteeing the local government's sovereignty over its data, protecting said data, ensuring its transparency and promoting new uses. This is a collective process involving citizens in its preparation, and in which certain private, voluntary and public actors engage with the community in order to implement the charter's commitments and principles.

> **Assessment after one year of use:** the charter is now considered a data-management tool.

> **Benefit:** an ethical framework to protect citizens and regulate the use of data within the local area.



### /// ECO-FRIENDLY HIGH ENERGY-EFFICIENCY DATA STORAGE

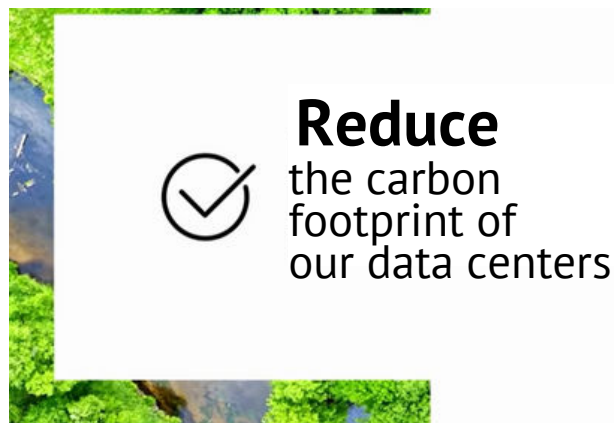


The data-centre industry is a particularly energy-intensive sector, **accounting for around 4% of global electricity consumption and 1% of global greenhouse-gas emissions.** In order to face up to digital growth (data storage, etc.), the data-centre industry must adapt to responsible uses.

#### Engie's data centre for a "greener" digital environment

In the UK, Merlin, the new data centre in Swindon, was designed with the help of ENGIE. This data centre relies on the use of renewable energies, as well as the design of more energy-efficient infrastructure and better maintenance.

> **Benefits:** It saves 3,950 tonnes of CO2 emissions per year with its current capacity, compared to a conventional design. More than 90% of Merlin's components are reusable and recyclable. Extending the life cycle of servers decreases depreciation and lowers the carbon emitted during the production and recycling of equipment.



### /// A MODULAR AND COLLABORATIVE DIGITAL TWIN



A digital twin uses real-world data to create a simulation via a computer program. However, its products are inflexible – requiring both laborious development and long and costly integration. Its components are interconnected and interdependent, rather than flexibly associated as in the case of modular programmes.

#### Connec(t)win from Egis, a fast, lightweight and resilient digital twin:

For Egis, Connec(t)win is a digital twin concept based on a modular and collaborative vision for communities and transport infrastructure operators. This solution is based on "the connection of applications recently launched on the market (modelling, analysis, field data collection, etc..) and the reuse of programs already installed in the information systems of local government and operators".

> **Benefits:** shortened lead times, low implementation costs, reduced risk of unexpected changes, faster access to documentation, contextualisation of alerts, better traceability, data continuity between one tool and another and easy access to mobility





### /// THE GROWING CYBER-ATTACK VULNERABILITY OF SMART AND SUSTAINABLE CITIES



Cyber-attacks are becoming increasingly common (Grand Ancey, La Rochelle, Aix Marseille, Angers) and have the capacity to paralyse local governments. It takes two years to completely repair the damage caused by these attacks: data recovery, restoration of the information system, ensuring the continuity of public services, etc.

#### Angers, an example of resilience in the face of cyber-attack

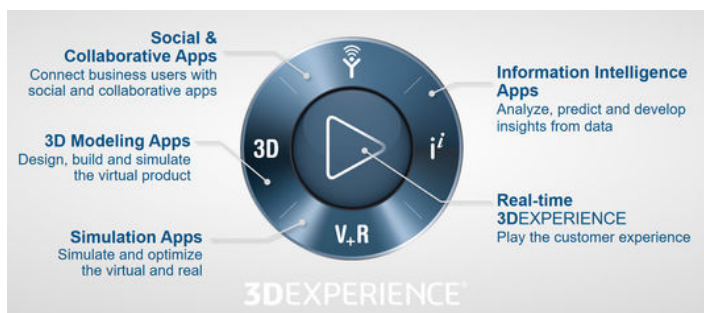
Angers City Council was targeted by hackers, who managed to penetrate its information system. Engie supported the city council as they undertook remediation work (re-commissioning of tools: messaging service, internet access, business software) and the reconstruction of a secure information system, adapted to withstand future attacks.



Photo : Daniel Jolivet, Flickr

> **Benefits:** Engie has put its solutions at the service of companies or local governments, addressing the entire cyber-security cycle – threat identification, mapping to prioritise certain risks, remedial or reconstitution services and cyber-insurance.

### /// THE 3DEXPERIENCE PLATFORM, A SYSTEMIC APPROACH TO PROJECT MANAGEMENT



The 3DEXPERIENCE platform leverages data to model and test products and processes in order to identify more sustainable and efficient projects. Bouygues Construction is currently adopting this platform from Dassault Systèmes and expects to achieve energy savings and develop new practices for tracing and managing waste.

The platform, which uses the integrated data from across the company, allows you **to plan, manage and ensure the traceability of your environmental performance throughout the life cycle of products or processes.**

> **Benefits:** modelling the entire life cycle of projects and increasing collaboration between different business lines to test greener products and processes before engaging in physical production.





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In order to make the digital world compatible with the limits of our planet, we must question the way in which digital transition has been conceived in recent years.

Measuring our digital impact in terms of carbon footprint is a pioneering approach, which consists of calculating greenhouse-gas emissions related to the city council's information systems- in order to measure environmental impact.

#### The Lyon City Council launches its first carbon-footprint calculation for its digital technology

Through this assessment, Lyon City Council seeks to identify the levers that may reduce the environmental footprint of IT services and question needs and uses in order to implement more responsible solutions.

> **Assessment:** the large size of the city council's IT inventory (around 50,000 items) is responsible for the majority of its emissions. The same is true of its consumption of user devices, which represents 99% of the total carbon footprint alone.

> **Lesson to be learned:** Reduce the size of the IT inventory, coupled with cultural integration of digital challenges and extending the life of equipment (6,500 computers for the town hall) in order to save equipment and waste by 20%.

### /// TACKLING THE DIGITAL DIVIDE WITH A DIGITAL PASS

While more and more administrative procedures are carried out online, a large part of the population is excluded or struggles with the use of digital technology, especially during the health crisis. This digital illiteracy, termed "illelectronism", particularly affects the most vulnerable populations.



#### Montrouge's digital journey for all

In 2021, Montrouge Town Council implemented a system known as the "**Pass Numérique**" [digital pass], as part of its support and solidarity plan to facilitate access to digital technology for all its citizens, particularly during this period of crisis. It has created a **clear and simplified Digital Journey for All**, bringing together all stakeholders in order to provide a precise response to the needs of each individual.

> **Benefits:** combatting the digital divide by enabling audiences with little experience in the use of digital technology to master the tools and their uses, and to access increasingly digitalised services online. This plan also seeks to create social links between learners and existing actors working to support beneficiaries, offering greater visibility to existing services.





This fact sheet presents a selection of exemplary projects highlighted on the Sustainable City by France portal to showcase French ambition and expertise in the field of sustainable cities, particularly among international professionals.

The "Sustainable City by France" sheets are an updated version of the sheets previously published in 2015 by the Vivapolis network with a view to welcoming foreign delegations to France and promoting French achievements at international scale.

The Sustainable City by France (SCbF) NGO is the result of the convergence between the Institut pour la Ville Durable (IVD) and the Vivapolis network and is the place to capitalise on disseminate and support the implementation of French expertise and know-how in the field of sustainable cities, both in France and internationally.

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