TRAFFIC MANAGEMENT in urban areas

>>> THE FRENCH EXPERTISE <<<
A SECTOR OF EXCELLENCE IN FRANCE, dating back from the 1970s, urban traffic management has led to the development of particularly innovative tools. The specificities of French towns, notably their very high density, has led to the development of effective systems of traffic management. French companies were able to develop these tools smoothly, with and for the towns, in response to the mobility needs of today and in anticipation of those of the future. French expertise has become a global reference point in this domain.

Innovative and interoperable, the urban traffic management systems combine a range of equipment and services: traffic lights at junctions, access control equipment, variable message signs, various sensors, on-board equipment in vehicles, parking terminals, communication equipment, central supervision and regulation systems, information systems and services. These different systems are perfectly compatible with each other since they all use standards agreed on by the towns, the state and the industrial sector. In addition, particularly stringent certification procedures assure the quality and robustness of this equipment.

These adaptable systems have been upgraded to become more sustainable. They are one of the levers of action that support the Urban Transport Plans, now required in all French agglomerations with over 100,000 inhabitants. Thus the traffic management systems can be used by actors in the mobility sector to reduce individual motorised traffic and promote active means of transport (walking, cycling) and public transport.

Quality performance in urban traffic management systems requires close cooperation between all actors, institutional, managers of the different infrastructures and transport operators. These systems should take the particularities of each region into account: French engineering firms are well-placed to provide guaranteed expertise in this domain. Finally, these systems require qualified human resources and effective maintenance. High-level training opportunities and quality maintenance services address these needs.

*The measures/means and companies mentioned in this document are given as examples and do not claim to be exhaustive.*
TOOLS for the MANAGEMENT of URBAN TRAFFIC

- controlling intersections with traffic lights
- access to parking and parking guidance
- controlling traffic sensors
- intelligent pedestrian crossing
- new urban delivery services
- tracking public transport vehicles
- video analysis
- access control to regulated traffic areas

CENTRAL TRAFFIC CONTROL SYSTEMS

- DELIVERY
- PARKING
- TRAFFIC
- USERS INFORMATION
WITH THE DEVELOPMENT OF THE AUTOMOBILE INDUSTRY in the 20th century, traffic lights have become vital as a way of regulating the ever-increasing level of traffic and ensuring the safety of motorists, pedestrians and cyclists.

Today, smart transport systems help to improve traffic management, including public transport. In France, the number of particularly densely populated towns, used by large numbers of road users, has led to the development of innovative solutions.

Managing TRAFFIC FLOW

The Gertrude system

The combined semi-public company Gertrude Saem was founded in 1981 by the urban community of Bordeaux. Its initial aim was to reduce road congestion. The system marketed by this company is now used in many towns in France and across the world: Dunkirk, Reims, Troyes, Metz, Montpellier, Algiers, Monterey, Porto, Lisbon, Wroclaw and Beijing.

Scheme

The Gertrude scheme enables real-time management of traffic lights. Using a network of sensors that measure traffic, it calculates every second the optimum settings of different traffic light junctions and transmits this information to the controllers.

Management

Traffic assessments rely on a dense network of sensors that record traffic flow and road occupancy and detect public transport vehicles. In order to reduce the costs of installing sensors, many towns now use wireless sensors (see Hikob firm page 17).

The system settings can be adjusted so as to:
- stimulate traffic flow on a certain road;
- reduce speed on another road;
- prioritise pedestrians at crossings;
- facilitate the circulation of public transport vehicles and emergency vehicles.

The system also contains a supervision function to manage various incidents and events.

Navinéo

Navinéo is a system for real-time monitoring of a bus fleet using geolocalisation. The Engie Ineo firm has developed a variety of services: bus regulation, information on waiting times, incident management and requests for traffic light priority.

Scheme

Using a connected bus system, Navinéo notably makes it possible for the system that gives priority to public transport vehicles at traffic lights to be effectively managed.

Management

Whether the aim is to introduce a high-level bus service, or resolve specific local problems or improve punctuality, this system can be adapted to the characteristics of the junction and offers several different types of priority solutions.

- Centralised control: the on-board calculator filters priority requests in relation to the status of the bus (ahead/behind schedule). It sends the request, via the operation assistance system radio network, to the central traffic light management system which issues priority orders, taking into account the conditions recorded (degree of emergency, state of the traffic).
- The request for long or short range priority: each vehicle controls the triggering of the traffic light in the run-up to the intersection. For short range light turning, the priority request is transmitted locally directly from the vehicle. For long range light turning, the priority request is transmitted by the network's long range radio infrastructure.
THE LAW TO MODERNISE REGIONAL PUBLIC ACTION AND AFFIRM METROPOLISES of 27th January 2014 introduced decentralisation of parking jurisdiction.

The law provides that municipalities and inter-municipal associations should possess the means to organise parking regulation on public roads and to reinforce the efficacy of their urban mobility policies.

To deal with the current challenges of urban parking new management systems have emerged. This development is reinforced by the law of 2014 which provides that municipalities and inter-municipalities can delegate the control of on-street parking and set the financial penalties in the event of non-payment.

Optimising PARKING MANAGEMENT

Engie Ineo is an expert in electrical engineering, information and communication systems, transportation and mobility. With a network of 300 agencies in France and worldwide, it covers a very wide range of activities: installing transport, telecommunication and energy infrastructures, tertiary and industrial projects, security and defence projects. It works in all stages of these projects, from design to implementation. With over 15,000 employees, it is an innovative company that supports municipalities and regions in energy and digital transition. Engie Ineo is part of the Engie group. www.engie-ineo.fr

MediaCity

In operation on the T3 line of the tramway in the Paris region, this service guarantees priority to trams and ensures no cars or other road vehicles can block the level crossings.

Scheme

Citilog has developed an innovative solution for detecting traffic jams based on integrated video analysis in its MediaCity product.

Management

This product is used in around 20 crossing points between this tram line and the road network. The analysis module produces real-time calculations of the spatial occupancy rate of waiting lanes for vehicles turning left. When a blockage risk is identified, an alarm is set off which extends the period of the interphase allowing the level crossing to be cleared so that it is free of all vehicles when the tram arrives. An approaching tram thus benefits from absolute priority to ensure comfort and commercial speed.

THE

- Increase in commercial speed and reduction in the number of vehicles in queues by reducing waiting times at traffic lights.
- Reduction of energy consumption.
- Driving flexibility and improvements in comfort.
- Journey time reliability.

THE MAIN MEASURES

- E-parking
- Optimisation of the use of parking spaces
- Increase in commercial speed and reduction in the number of vehicles in queues by reducing waiting times at traffic lights.
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**The Whoosh mobile application**

The city of Cannes has been using the Whoosh service since 2013. It is marketed by Parkeon and facilitates paid on-street parking.

**Scheme**
Whoosh lets users pay remotely for parking rights using their mobile phones. It is free to register for the service which is done on the application or on the internet by entering one’s registration number and e-mail. Vehicle number plates and bank details are only requested during the first transaction. Then, each time the car is parked, users can simply fill in the parking zone and the time period required. The parking charge is then paid by direct debit. The time period can be extended remotely and users receive a warning before the end of the parking time period and thus avoid infractions.

**Management**
All transactions are recorded in a data centre and are accessible on-line. Payment monitoring, management of parking ticket appeals and management of the end of time period alarm are all integrated into one interface. Parking validity can be monitored by parking enforcement officers by entering the number plate on their tablet which is connected to the web service. Eventually, the same tablet will issue the parking ticket if an infraction is found.

**The city of Cannes**
- Offers a simple, quick, practical, secure and ergonomic payment method which makes paid on-street parking more convenient, dynamic and fair in the eyes of the users;
- Increases the rate of payment compliance by motorists and thus increases the associated revenues;
- Can develop, using the data gathered, optimum methodologies for regional management, by analysing user behaviour and road use.

Whoosh’s services are now used by over 30 local governments such as Lille, Strasbourg, Nanterre, Saint-Étienne, Montreuil and Besançon.

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**A parking guidance system**

Unibail-Rodamco, owner of the Vélizy 2 shopping complex in the Paris region, one of the largest shopping complexes in Europe, introduced a parking guidance system in September 2011. The aim was to allow customers arriving at the shopping centre by car to easily find a vacant parking space in the car park.

**Scheme**
The parking guidance system in the exterior zones of the car park is made up of:
- Occupation sensors, supplied by SmartGrains and fitted into all 3,000 parking spaces in order to count the vehicles;
- Active-control display boards, supplied by the company SVMS, to indicate the number of free spaces.

When a motorist arrives at the car park, he/she can read the number of free spaces left in real time on the display boards. Zone-by-zone information is provided at the entrances and junctions and at the end of each row.

**Management**
Each space is equipped with a wireless, durable and extremely low consumption sensor (battery autonomy of 5 years). Each sensor is stuck on the ground surface and detects the presence or absence of a parked vehicle above it by measuring variations in the magnetic field. This detection method is not affected by exterior environmental conditions (rains, dust, etc.). The information is transmitted by radio waves to the totems at the start of each row and to the display panels which display in real time the number of available spaces and their location. As a complement, the shopping complex manager has the software to assess in real time how full the car park is and thus obtain useful statistics to manage the complex.

**The city of Cannes**
Parking guidance provides shopping centre managers with a dynamic, reliable and practical system so that their customers can find a parking space more easily and quickly. This system can increase the reception capacity of the car park by 10% and thus increase the number of visitors to the site.

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**Parkeon**

By offering a cross-cutting service for parking management and ticketing solutions for public transport, Parkeon now works in 60 different countries and is accelerating its growth in emerging countries, in Eastern Europe, Russia, Latin America, Africa and Asia-Pacifie, with a network of over 80 partners and distributors. The company employs over 1,100 people across the world, 500 of which are in Besançon.

Besançon is where Parkeon equipment is made but it is also the nerve centre where substantial R&D activities take place (over 8% of revenues are invested in R&D each year). In 2015, Parkeon’s total revenue amounted to 235 million euros.

- [www.parkeon.fr](http://www.parkeon.fr)
- [www.whooshstore.fr](http://www.whooshstore.fr)

**SmartGrains**
The start-up, SmartGrains, produces and markets a parking guidance package aimed at shopping centres, hypermarkets, supermarkets, stations and airports.

The company was founded in 2009 and employs about 10 people in Paris and elsewhere.
- [www.smartgrains.com](http://www.smartgrains.com)
On-road parking enforcement outsourcing

Among other objectives, many local authorities aim to encourage faster rotation in saturated areas, promote modal reporting and improve compliance to parking payment obligations. In response to these issues, many countries are allowing local authorities to delegate on-road parking control. This is the case in the United Kingdom, Belgium, Spain and since 1 January 2018, in France.

Scheme
At the end of 2013, the city of Madrid outsourced the management of some of its parking system to the company Indigo - over 84,000 paying on-road spaces.

Management
Indigo company designs of innovative solutions and services to improve parking space use and financial management.

- Automated enforcement
A car equipped with a camera reads number plates and analyses the status of the parked vehicles. The number plate reading and the information provided during payment are checked in real time. With this solution, 1,500 spaces can be checked in an hour. In comparison, walking parking attendants can check 150 spaces in an hour;

- Diverse payment means
Payment can be made in cash, by card (prepaid or bankcard) or with a mobile phone (iOS, Android). If the motorist goes over the time limit, he/she must pay a fixed parking fine of €60. However, it is also possible, if the infraction does not go over an hour, to immediately regularize the situation for a total of €4.

- Price modulation
This means that parking can be managed in function to the type of client (resident or hourly), the type of car (polluting or less polluting) or depending on the occupancy rate of the zone. For example, prices can be raised in high traffic zones (town centres) in order to decrease the number of cars and relieve congestion.

THE MAIN MEASURE

Implementing multimodal management

In response to a growing demand for transport, cities have implemented policies that promote public transport and non-motorised means to limit pollution and mitigate saturation of the road network.

The interaction between the different modes makes a multimodal management of travel necessary. Many cities have decision-making structures that facilitate discussion between the actors.
Implementing MULTIMODAL MANAGEMENT

Campustrafic

Toulouse Metropole has developed a centralised approach to optimise the effectiveness of its transport network in order to improve journey quality and facilitate crisis management.

Scheme

Campustrafic is an overall management system for transport in the Toulouse agglomeration. It brings together several different management services in the same location:

- the CAPITOUL control station for the Toulouse urban network;
- the Tisséo control station for managing the public transport services in the agglomeration;
- the control station for traffic management and engineering managed by the interdepartmental road directorate of Southwest France;
- the control station for the Motorways of Southern France company.

Management

Toulouse Metropole has a decision-making structure based on cooperation, action design procedures to manage malfunctions on the networks, a shared building which facilitates dialogue between the different operators and interconnected systems allowing operators an overall view of all the different networks. The compound also possesses a crisis management room so as to rapidly implement an incident command system.

THE

The structure in place has demonstrated its effectiveness in some particularly serious crisis management situations.

- It makes drawing up a multi-actor traffic management plan considerably easier so as to respond to protests, maintenance periods and festive events.

Claire-Siti

The Claire-Siti platform has been developed by the French institute of science and technology for transport, development and networks (Ifsttar). It is used in France and abroad in Brussels and New Delhi.

Scheme

Claire-Siti is a tool designed to manage mobility phenomena with a resolutely multimodal and inter-modal approach. The system allows:

- the integration of multimodal transport data;
- supervision in real-time of how all types of network are operating;
- analysis of performance (service quality, greenhouse gas emissions);
- help-to-mobility services to be provided.

In Brussels, the system is used to supervise bus and tram networks.

Management

Claire-Siti has different functions:

- an interpretation function that tracks performance and incident indicators;
- a diagnosis and information function that communicates network malfunctions, highlights the causal links between different malfunctions, and informs users and operators on disruptions affecting the various modes of transport;
- a decision-making function for action planning (such as bus timetables or regulatory actions) in non-real time. Actions can then be enforced in real time;
- a disruption monitoring function that replays operating days in non-real time in order to carry out comparative analyses;
- a projection and simulation tool based on two modules in order to make road traffic forecasts in real-time and evaluate new mobility services using multi-agent simulation.

These features rely on a model of innovative generic data based on three areas of data: the space describing the logical network, the representation space and the resources and moving units space.

THE

- The system links representations of the different modes, network or lines to pinpoint interactions, diagnose phenomena and make recommendations on operational actions.
- This instrument can be installed over (as an overlay) any existing type of regulation system, monomodal or multimodal.
- A monomodal version is included in the THALES company’s commercial offer.

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4. Ensuring SAFETY

Many disruptions (weather related, accidents, demonstrations) regularly impact network operations. Their effects on user safety depend on the nature of the event: whether it can be foreseen, how long it lasts and the traffic on the network at the time.

A key issue is whether there are well-functioning tools in place to define and deal with these events. Innovation has made surveillance and decision-making tools available to managers, as well as complete expert systems adapted to the situations encountered.

The Grizzly system

Management
This instrument collects data in real time on temperature, humidity and dew points in critical and specific zones that can not be covered by Météo France forecasts. This information, transmitted by radio links, is published on a dedicated website that operators can consult so as to better target their salting operations.

The sensors have an energy autonomy and lifespan of 10 years.
Installation and connection costs are reduced. These wireless communicating sensors can be connected to networks already in place.
The intervention initiation process is optimised. It thus contributes to reducing the consumption of labour resources and materials and reduces the environmental impact of salting operations.

Scheme
Grizzly is a network of wireless, autonomous sensors, installed on road surfaces and outdoors. These sensors can detect icy conditions in critical zones in order to optimise operations.

The product of a collaboration with the HiKoB start-up, this innovative system allows real time information gathering on climatic developments on the road network. Thus winter road interventions can be initiated with optimal efficiency.

HIKOB designs wireless, autonomous and multi-point acquisition systems designed to supply data from the ground in real time. They are built with energy-autonomous magnetometer sensors. Cost-efficient, easy to install, with no wiring, they require no preventive maintenance operations. They are a reliable, effective and cost-efficient solution for operating managers of networks, roads and urban mobility. They automatically connect to an IP network using the auto-configuration function. In order to be easily connected to traffic regulation systems, they possess standardised interfaces (REST-XML, DIASER communication interface, serial communication bus and dry contact outputs).

www.hikob.com

LYON METROPOLE
Intelligent pedestrian crossing

Intelligent pedestrian crossings, used in Toulouse since 1986, have demonstrated their ability to take into account two types of road use: that of pedestrians, which is individual and not very predictable, and that of motorists, who circulate en masse along specific channels.

Scheme
The intelligent pedestrian crossing is an intelligent and educative traffic light helping pedestrians to cross busy roads. The scheme comprises of:
- a modified pedestrian light which includes a flashing yellow line between the green man and the red man;
- classic three-coloured lights for vehicles;
- a system that detects pedestrians;
- a mast that includes additional signalling and a system of lighting the pedestrian crossing during the night.

Management
When there are no pedestrians, the flashing yellow light is off; it starts flashing as soon as a pedestrian stops at the crossing. At the same time, the three-coloured lights for cars start flashing in yellow to warn the driver of the presence of a pedestrian. If the pedestrian decides to cross within 5 seconds (following when he/she is detected), the yellow light continues flashing for a time so that the pedestrian can reach the opposite pavement. Otherwise, the vehicle lights turn to red in order for the pedestrian light to turn green.

This system only stops cars – the red light for cars – if pedestrians need them to. It does not make pedestrians wait for no reason when they can and wish to cross immediately using the yellow flashing light.

THE
- The system gives the lights credibility and makes pedestrians more responsible.
- It reduces the energy consumption of the devices.

Suppliers of this type of system are:
For the traffic lights, FARECO and Lacroix City
- www.fareco-fayat.com
- www.lacroix-city.com
For the pedestrian detectors, ASSYSTEM supplies the CAPTEC detector and FLIR the SafeWalk detector.
- www.exatelys.com
- www.flir.fr

THE GOODS TRANSPORTATION SECTOR, which makes up 15 to 25% of urban traffic, remains one of the largest emitters of greenhouse gas pollution in cities and contributes to road congestion.

In order to limit the nuisances caused by road freight transport in urban areas (congestion, noise, pollution), public authorities encourage alternative ways of transporting goods, including bicycles, electric vehicles or natural gas vehicles, as well as waterway or rail transport.

THE MAIN MEASURE
- Goods delivery by waterway or bicycle
Delivery of goods via the Seine

Franprix, a subsidiary of Groupe Casino, have been delivering goods via the Seine river to hundreds of shops in the heart of Paris since August 2012. This scheme was developed in partnership with the XPO Logistics group (road haulier), Haropa Ports of Paris, SCAT (waterway transport) and Terminaux de Seine (a goods handler). It received support from Voies navigables de France and the Île-de-France regional authority.

The goods, loaded in containers, are transported by lorry to the river port and then on a barge into the centre of Paris. The barge is then unloaded and the goods are delivered directly to shops in Paris as well as in several Hauts-de-Seine municipalities.

La Petite Reine

La Petite Reine is a home delivery company that makes all its deliveries using a 100% green and silent fleet. It was the first company to launch an ecological delivery service in Paris in 2001. Ten years later, the Star’s Service group, leader in last-kilometre delivery, has become the first stakeholder in la Petite Reine.

The organisation relies on the coordinated use of urban logistics platforms and clean vehicles designed to be compatible with high urban density. Employees can carry out neighbourhood deliveries using depots located in central Paris. Delivery by Cargocycles® permits better access to city centres, including pedestrian zones in city centres. Ergonomic and taking up little space, the bicycles can be parked near the delivery addresses and thus reduce traffic jams. The delivery drivers carry out over 400,000 environmentally-friendly deliveries per year and cover over 1 million clean kilometres every year, with no CO₂ or particulate matter emissions and no noise pollution.

La Petite Reine also plays a social role. The company runs a scheme to employ young unemployed and/or unqualified people as delivery cyclists and maintenance workers. In the company, 30% of staff are employed on fixed-term back-to-work contracts and are supported by a team of support workers and are each assigned a back-to-work agent.

THE

LOVELO

Created in 2009, this small-to-medium business has produced a wide range of bicycles and rosalies in response to the various urban services needs. It is located in Eure-et-Loir and employs 6 people. Its sales revenues are progressively rising, including export sales.

www.lovelo.com
The m.starbusmetro mobile application

Since October 2012, the Keolis transport company and the city of Rennes have provided free real-time transport data (real-time bus schedules, number of available parking spaces etc.) and have made the m.starbusmetro mobile application available as a complement to this system. This application allows instant access to timetable information in real time for the Star network (Star: Rennes agglomeration public transport service - bikes, buses, underground and park-and-ride) using a smartphone connected to the internet.

Scheme
The application provides information in real time on:
- star bikes (a bike share system), including the number of bikes and spaces available in stations;
- the Star network (the bus service of the agglomeration), with bus times for each stop;
- the underground line A, including underground station statuses (open/closed) and whether the station lifts are operating;
- the park-and-ride schemes, including the number of available spaces in each car park and the status of the park-and-ride (open/closed).

Management
All stops on the network are referenced and equipped with specific bar codes (QR). A traveller with a smartphone can read these codes found at every bus stop in the Star network to get real-time bus schedule information. The information is also available by typing in the bus stop name. The traveller can thus immediately receive the exact time the next bus will arrive. The Star network’s real-time data is also available as open data. The information is provided as downloadable files.

THE
The city of Rennes, in conjunction with Keolis, was the first French agglomeration to provide open access data on its transport network. This partnership has made it possible to develop new services such as the Handimap application to help disabled people obtain urban mobility or the Isokron application that merges transport data with that of social networks.

THE
The Star network is “NF Service” certified. This label, based on traveller satisfaction, is a quality guarantee of the service provided by the Star network.

TECHNOLOGICAL ADVANCES in the geolocalisation and communication domain have led to the development of real-time information tools.

Transport information makes it easier for travellers to plan their journeys and makes the use of public transport a more attractive option.
Solar-powered traveller information terminals

The solar simulator, LumiSunX™, launched by the enterprise Lumiplan is a calculation procedure developed in collaboration with institutional research centres and academics. It facilitates the installation of solar-powered traveller information terminals.

Scheme

The simulator was used in Grand Lyon, on the initiative of the transport syndicate of the Lyon agglomeration, where over one hundred solar-powered traveller information terminals have been installed in the city.

Management

This simulator is capable of measuring the capacity of a site to operate solar-powered traveller information terminals (TIT) and provide a solution in the form of an adapted product in order to guarantee continuous and optimal operation in any weather. The preliminary stage allows the technical characteristics of the TIT in question to be determined in a rational manner. For this purpose, the solar TIT includes high-performing components: photovoltaic panels made of monocrystalline technology, chargers equipped with high-performing MPPT (maximum power point tracking) technology, very high storage density batteries, low consumption electronic components and liquid crystal displays.

THE

> Equipment that respects the environment with a near-zero electricity consumption.
> A traveller information service available 24 hours a day and 7 days a week.
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<td>TTS</td>
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<td><a href="http://www.ttsys.fr">www.ttsys.fr</a></td>
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<th>Cameras, automated image processing, accident detection</th>
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<td>HKKab</td>
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<td>BMI</td>
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<td>Ministry for an ecological and solidary transition</td>
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<tr>
<td><a href="http://www.ecologique-solidaire.gouv.fr">www.ecologique-solidaire.gouv.fr</a></td>
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<tr>
<td>The French Centre for Studies and Expertise on Hazards, the Environment, Mobility and Development (Cerema)</td>
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<td><a href="http://www.cerema.fr">www.cerema.fr</a></td>
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<tr>
<td>French Institute of Transport Science and Technology, Planning and Networks (IFSTTAR)</td>
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France has solid expertise in many fields. Through this collection, come and discover the wealth of French know-how thanks to concrete examples from throughout the national territory.

www.ecologique-solidaire.gouv.fr