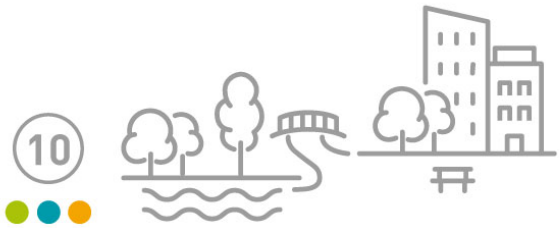
Principles and References

BUILDING **SUSTAINABLE CITIES**

egis

Design principles for **sustainable, peaceful** and **attractive cities**

1,5°C
1.5°C **PATHWAYS**
TRAJECTOIRE1,5°C



Water and nature for thriving populations and biodiversity (permeable surfacing and water cycle, green infrastructure and green spaces)

Low carbon and bioclimatic design and operation

Hospitable Public Spaces in favour of the well-being and health of populations, with a high level of comfort (acoustics, cool islands, universal accessibility, safety, reduction of nuisances, etc.)

Cultural approach, reinforcing identity, character and heritage

Risk-resilient design and operation (natural, sanitary and technological) including **climate change adaptation**

Compact urban form, **building the city on top of the city**, limiting urban sprawl and **land remediation**

Alternatives to cars and trucks (pedestrians, cyclists, public transport and innovative modes)

Optimizing performance for urban flows (mobility, energy, waste, water, food...) digital solutions serving the city-system

Social and economic **inclusion** of all populations, integration of informal settlements, **reduction of** construction site **nuisance**

Mixed Use neighbourhoods (housing, business, shopping, crafts, industry, agriculture, tourism, leisure...)

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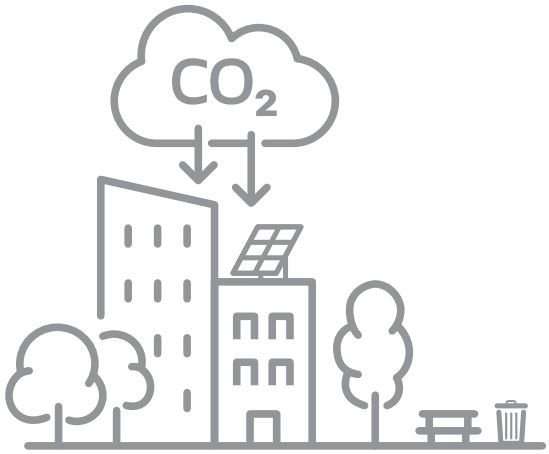
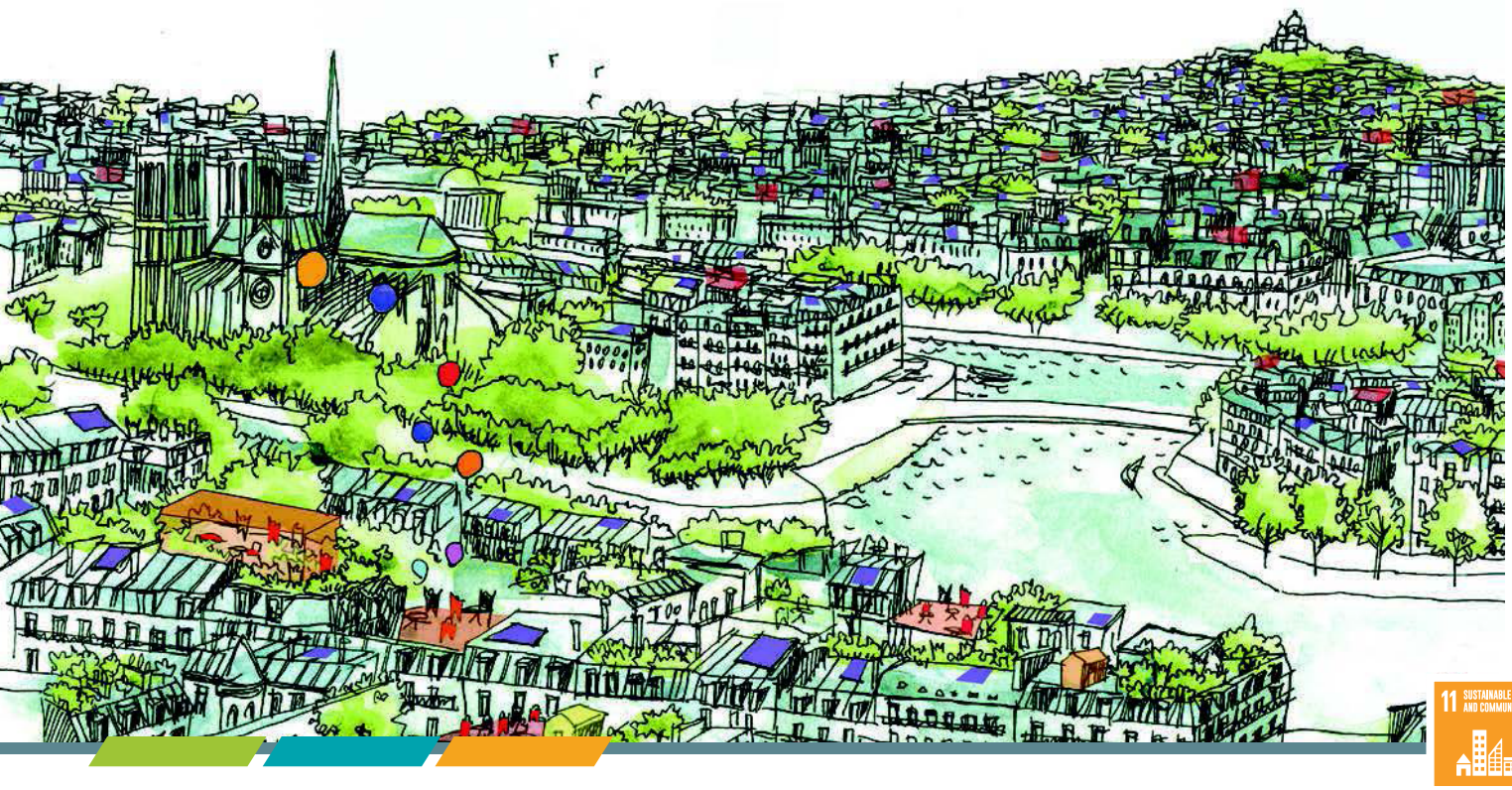


CARBON NEUTRALITY

RESPECT OF BOTH NATURAL AND HUMAN LIFE ENVIRONMENTS



FRANCE: **LOW-CARBON** PARIS 30 YEARS TO ACHIEVE CARBON NEUTRALITY IN 2050?
PARIS CAN DO IT

France's capital is committed to drastically reducing its greenhouse gas (GHG) emissions. The study, carried out by a consortium led by Elioth by Egis*, involving teams from Conseil by Egis, Quattrolibri (low-carbon strategy consultants) and Mana (sociological consultants), suggests a series of radical measures.

This study is like Ali-Baba's cave: a rich source of opportunities, challenges, solutions, questions, innovations, directions, ideas and stories. Everyone should read it, to see everything we can do for our major cities.

This strategy of carbon neutrality required advanced technical and scientific work to provide an objective assessment of mitigation strategies for each issue, and of the modelling of changes in the compensation and sequestration of residual emissions.

To achieve complete neutrality, the consortium suggested the implementation of emblematic measures, among which:

- 6 million sqm of solar roofs,
- Renovation of up to 75% of the current housing stock,
- 150 hectares of urban agriculture,
- 75 % of diets with reduced animal content, prioritising "vegetarian, local, and seasonal" food,
- Halving waste per capita,
- Half the number of cars, which should be twice as full, based on a carpooling system,
- A massive shift to electric cars,
- 52 car-free weekends a year in 2050,
- Transformation of the Paris ring road into an urban boulevard,
- 5 times more freight on the Seine river.

→ **Find the study on the dedicated website: http://paris2050.elioth.com/**

* *Elioth by Egis offers advanced expertise on complex structures and geometries, on building façades, and on energy, climatic and environmental challenges, on an individual building or city-wide scale.*

ECO-RESPONSIBLE **BUILDINGS**

Today in France, **for every sqm of building built**, **1 tonne of CO_2 is emitted**. The challenge is to reduce the CO_2 of each sqm built.

YOUR SECRET WEAPONS FOR REDUCING CO_2

- Renovation of existing structures
- The mutability and sharing of spaces
- Cradle-to-cradle approach: an approach that incorporates an ecological objective of zero pollution and 100% reusable materials, at all levels, from the design to the production and reuse of the product)
  - Bioclimatic solutions
  - Organic materials
  - Carbon-free energies
- A holistic approach (reconciling climate concerns and energy needs)

METHODS

- Life cycle analysis of construction processes and energy scenarios
- Systematic recovery of biobased and eco-design materials
- Controlled energy performance
- Reuse and recyclability
- Anticipation of carbon signatures in the upstream phase

THINK TANKS AND CERTIFICATION TOOLS

Egis is a founding member of the BBCA label launched in 2015. This label allows for quantifying a building's low-carbon performance and compare it.

Egis is part of the working group Réflexion Bâtiment Responsable 2020-2050, which is responsible for preparing the future French RBR 2020 regulation (responsible building regulation).

Egis is part of various working groups examining the development of environmental standards.

Egis is part of the technical commission of AdivBois, an organisation for the development of residential buildings in wood.

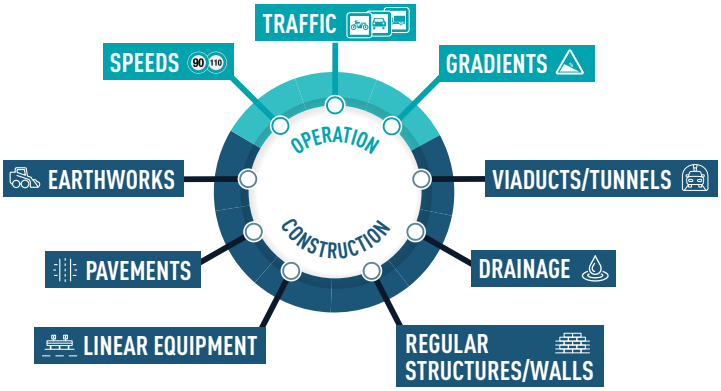
Egis has a technical wood division, T*eamber by Elioth*, which brings together business expertise related to the use of wood (*Elioth by Egis is an entity* specialising in innovative structures and environmental design).

LOW-CARBON **ROAD INFRASTRUCTURE**

THE VARIWAYS® ECO-COMPARISON TOOL FOR SAVING CO_2

10% of greenhouse gas emissions generated by a road infrastructure come from the construction phase and 90% from the operating phase through vehicle emissions.

Egis developed Variways® to evaluate the carbon impact of a road infrastructure during its construction and operation phases.



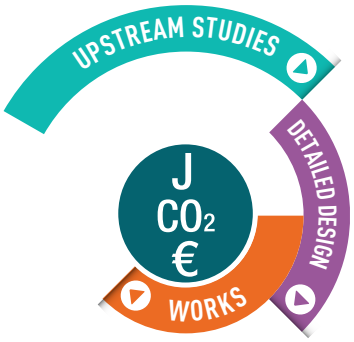
THE ADVANTAGES OF VARIWAYS®

Variways® calculates 3 indicators:

- Energy consumption: J
- Greenhouse gas emissions: CO_2
- Their monetization: €

Variways® can be used for the duration of the project:

- Upstream studies: comparison of variants based on ratios
- Detailed studies: optimisation of the variants selected based on quantity surveys
- Work phase: analysis of indicators after the works



OPERATION

- In France, Variways® has been used on the RCEA-national road 79 (Allier region), on the widening of the A46 South motorway, on the Arles motorway bypass, on the New Coastal Road in Reunion Island, on the national road 164, on the Marseille L2 bypass (A507).
- Internationally, it has been used in Kosovo, on the Morine – Merdaré motorway (ENR 2013 prize for the best overall project in the Roads and Motorways category), in Qatar on Expressway projects.

SUPPORTING REGIONS IN TRANSITION

To best support your regional projects, we have built a truly multi-cultural team. Our consultant's strategic vision combined with the technical expertise of the engineer, means you will receive bold, pragmatic advice to help you address the major challenges of this period of energy and ecological transition.

Beyond the objectives of economic sustainability and regulatory compliance, there are new challenges to face when both converting existing buildings and developing new projects. Changing uses, urban integration, energy and resource efficiency, among others, make it crucial to implement a holistic approach. Of course, our regions must be smart and efficient, but let's also make them pleasant, healthy, responsible and supportive, by uniting residents and economic players in a collaborative movement towards resilience and community.

ENERGY PLANNING
- Regional diagnoses
- Proposal of transition scenarios
- Modelling of energy systems (needs, productions, networks)

LOW CARBON STRATEGIES
- Completion of Bilan Carbone® reports
- Development of 2°C pathways

SMART GRID & SMART CITIES
- Assistance with project structuring
- Data Mining & Machine Learning
- Connected objects and smart meters
- Data governance
- Service design

ENERGY EFFICIENCY
- Energy audits
- Heritage Master Plans
- Energy management

RENEWABLE ENERGY
- Feasibility study
- Monitoring of operations

CIRCULAR ECONOMY
- Material reuse in construction
- Ecodesign
- Industrial and commercial ecology
- Product-Service System strategy

CHANGE MANAGEMENT
- Management of action plans
- Mobilisation of local players
- Creation of communication and training plans
- Innovation management

PARIS: **BRUNESEAU NOUVEL R** PROJECT

Design of a number of buildings in the Bruneseau district (approx. 100,000 m²)

Ateliers Lion won the consultation launched by SEMAPA and the City of Paris in 2001 to improve the relationship between Paris and Ivry-sur-Seine in this complex area, and now proposes to inject a new intensity into the area through a dense and varied programme of works that will create a strong and dynamic relationship.

Inventing Bruneseau involves:

- developing a new hub to connect Paris and Ivry-sur-Seine;
- creating a new Parisian and metropolitan destination that will be dynamic, inventive, attractive, and in tune with the Arc de l'Innovation project;
- crossing the infrastructure (the Paris ring road) by making it an asset, a positive identifying element and no longer a constraint.

BIOCLIMATIC STUDIES OF THE BRUNESEAU DISTRICT

Providing assistance with the environmental, carbon, energy and air quality design:

The scale and ambition of the **Nouvel R project** enabled us all - designers, architects, property developers and engineers - to profoundly change our approach to the construction of a new district.

Our solution will genuinely apply the principles of carbon neutrality, the Climate Air Energy Plan of the City of Paris and the 1.5°C pathways, which are still all attainable.

CLIENTS
ICADE, Les Nouveaux Constructeurs, Nexity, AG Real Estate

ARCHITECTS
Hardel et le Bihan, Youssef Tohme, Buzzo Spinelli, David Adjaye

EGIS CONTACT:
Jocelyn Urvoy

2

Compact urban form, adapted to the local context; **urban fabric densification** and limiting urban sprawl

CARBON NEUTRALITY

KUWAIT: SOLUTIONS FOR SUSTAINABLE CITIES

The Public Authority for Housing Welfare (PAHW), Kuwait's government agency in charge of housing and urban planning, is now investing in large urban development schemes to meet the demands of a growing population, while considering the environmental challenges facing the country. In this context, the PAHW has commissioned Egis to develop various city solutions consistent with the hot, arid climate, with a focus on low-carbon power.
Using the example of the new city of South Al-Mutlaa, Egis presented various proposals for Kuwait's ecological transition, focusing on traditional techniques and local resources.

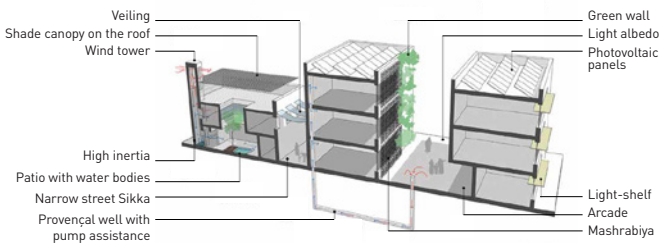
EXAMPLES OF PROPOSALS

- New services for the city, each with its associated costs and benefits, especially in terms of **saving energy**, and operating costs (Smart Waste Management, reduction of CO_2 emissions up to 50%; minimum 10% of the electricity in public buildings produced by solar panels).

- An **urban cooling network**. Egis put forward a scoping study defining the technical, financial and operating conditions with an estimate of the volume of oil saved (annual savings for the government estimated at **€59 million**, a **35%** energy saving).

- A city design manual for the PAHW including the definition of new rules for building future cities, encouraging new urban practices such as soft mobility (walking, cycling, public transport) and based on a bioclimatic design of the public space. The manual promotes a compact and polycentric city, neighbourhoods irrigated and connected by street and road types on a human scale.

- In line with the Kuwait National Plan, Egis put forward a green belt around the urban area, with an agricultural and recreational focus as well as acting as a thermal screen against desert winds (endemic species).



FRANCE: THE **ECOLOGICAL RENOVATION** OF THE **MONTPARNASSE TOWER**

Elioth by Egis took out top spot in the competition for the renovation of the Montparnasse Tower, alongside Nouvelle AOM, a collaboration between the three French agencies Frank Linazzi , Chartier-Dalix and Hardel & Lebihan

In 2030, the city of Paris will be able breathe again. In complete sync with the climate, the wind, and the light of the sky, Montparnasse tower will become a symbol of its time. "Super-passive", the building joins the ranks of the world's most efficient new builds. And it is even set to overtake them in terms of its carbon footprint, by saving on resources required for its reconstruction. This is a virtuous tower – an oxymoron made possible through the choice of its rehabilitation and extension of the lifespan of its structure and foundations, the building elements that had generated the most greenhouse gas during construction.

With this very first, energy positive and low carbon renovation, following the removal of all asbestos **Montparnasse Tower will reduce its energy consumption by 10 times** compared to the original project. It will be self-sufficient for 70% of the time it is in use, during which time it will not draw on any active systems and simply glide along. In addition to being exemplary for its energy efficiency, it will also be beautiful, standing tall with its ever-changing and light-filled "weather-coloured" exterior. This ultra-contextual and symbiotic Parisian tower will blend seamlessly into its neighbourhood, improving urban air comfort and promoting the mutual benefits of energy complementarity, including with the train station and future developments in the area.

- A super-passive tower
- A smart-grid-ready & symbiotic tower
- A positive energy & ultra-low carbon tower
- An innovative & frugal tower

"The future Montparnasse Tower will be multifunctional, active 24 hours a day and exemplary when it comes to the environment, with a tenfold reduction in its current energy use. It will be the world's first "wind tower", capturing wind energy and minimising mechanical ventilation. Finally, 80% of the existing façade will be re-used inside the tower, magnifying its heritage."

The design of the façade rests on two key concepts: on both sides of the building hanging gardens will be constructed. The first ten floors of offices will have conservatories, with outside access provided along vast balconies. These spaces bring an almost homely touch to the lower offices, and create an urban feel through their dialogue with the environment around the Tower. They also reduce wind at the base of the tower, improving the urban comfort of the surrounding area.

The other element which will improve public space through marginally adjusting the existing layout, is the establishment of large tree-covered patios at each of the four corners of the site. Anchoring the Tower even deeper into the Parisian soil, they reduce the "downwash" wind effect, bringing comfort to the esplanade and helping guide pedestrians between the Rue de Rennes and the future train station. The wind tower, this "Eole-Montparnasse", is designed to look after us, both inside and out.

ASIA: PROGRAMME TO **IMPROVE URBAN SERVICES** IN SOUTH EAST **ASIA**

Egis has signed a framework contract of over three years with the Asian Development Bank to make cities more liveable in six South East Asian countries.

The Asian Development Bank is supporting the authorities of six South East Asian countries (Philippines, Cambodia, Myanmar, Vietnam, Indonesia and Laos) in the financing and implementation of projects aimed at making their cities more liveable. South East Asia has embarked on a dramatic urban transition, with a massive rural exodus and a concentration of populations in often chaotically-expanding urban centres. The total estimated budget for the projects is nearly €1 billion.

Egis will provide technical assistance to the Asian Development Bank for three and a half years under a framework contract for the preparation of its "sub-projects" for urban water (drinking, waste and drainage water), waste management and urban planning.

Subsequent contracts will include master plans, feasibility studies, detailed design studies, and up to assistance with construction contracts.

A team comprising Egis experts in drinking water, sewage, urban planning, the environment and procurement will be based in the premises of the Asian Development Bank in Manila (Philippines) to coordinate and manage the sub-projects. Further Egis expertise will be brought into play as and when each of the sub-projects is launched.

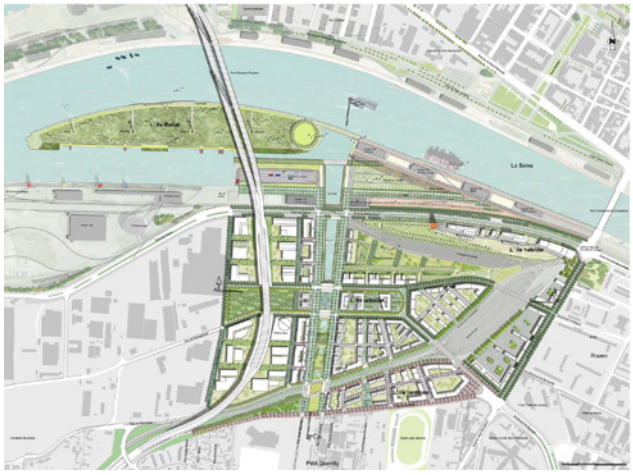
In this way, Egis will use its multidisciplinary, leading-edge expertise to improve the quality of life of residents in South East Asia's megacities and enable a sustainable future with suitable facilities.

ROUEN: **FLAUBERT ECO-DISTRICT**

The reconversion of industrial and port land for the construction of a new sustainable district

The Flaubert eco-district project will contribute to regenerating a 90 hectare section of the city port interface, currently inaccessible but with significant urban potential. It will ultimately accommodate almost 10,000 users, making it an efficient solution to urban sprawl and the use of natural spaces by developing an urban wasteland that is heavily impacting the environment. This eco-district project will offer 448,000 sqm of floor area including 42 % for housing, 4 % for business, 49 % for offices, 1 % for shops, and 4 % for equipment. As part of its urban project management mission Egis implemented and monitored the project's sustainable development management system, focusing on seven strategic objectives:

1. Fully integrating the neighbourhood into its urban environment.
2. Creating favourable conditions for alternative and sustainable travel.
3. Creating pleasant living conditions for all.
4. Achieving energy efficiency.
5. Improving ordinary and extraordinary biodiversity.
6. Making the most of the location of the site along the Seine.
7. Involving local people and regional stakeholders.



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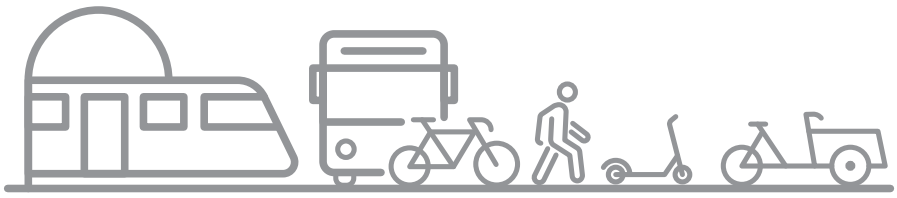
Alternatives to cars and trucks (pedestrians, cyclists, public transport and innovative soft modes)



CARBON NEUTRALITY

WELL-BEING OF POPULATIONS

CARPOOLING AS A SOLUTION TO CONGESTION

Of the 13.5 million people who drive to work every day in France, 90% travel alone. Increasing the average occupancy rate for commutes from 1.08 people per car (current rate in France) to 1.20, would solve the majority of traffic congestion problems.

Egis promotes the use of carpooling by offering a full range of infrastructure (HOV lanes, carpooling hubs, etc.) and equipment (signing, enforcement, etc.), all while incorporating the requisite interfaces with systems for organising carpooling.

Our expertise

- Travel and mobility studies
  - Regulatory analyses
  - Assessing the relevance of carpooling and the impact on traffic
  - Traffic modelling and simulation
- Creation of HOV lanes
  - Comparison of different layout possibilities
  - Dynamic lane management opportunities
  - Location of carpool parking areas
  - Equipment, signing and regulations
- Introduction of carpool control systems
  - Radar speed signs
  - Automated carpool speed checks
  - Sanctions for offenders
- Launch and monitoring of the system's operation
  - Strategies and operating policy
  - Development of the operating policy
  - Writing operating procedures
- Development of specifications

Carpooling is still in the experimental stages in France, but already projects are coming thick and fast. From La Rochelle to Grenoble, Bordeaux to Lyon, this new vision of the individual vehicle holds much promise:

- A decrease in traffic congestion resulting from a reduced number of vehicles travelling on roads
- A decrease in air pollutant emissions
- A new travel option that works alongside existing transport solutions

INDIA: BHUBANESWAR, **THE FIRST SMART CITY** "MADE IN INDIA"!

Egis managed the project to turn the city of Bhubaneswar in the east of India into a model smart, sustainable and inclusive city. This was the first contract awarded to Egis under the programme embarked upon by the Indian Government to create 100 smart cities.

In just two years (by 2020), Bhubaneswar, the state capital of Odisha, is to become India's first smart, modern and attractive city through the implementation of "smart" infrastructure and urban development solutions. Following a tender process, Bhubaneswar Smart City Ltd (BSCL) awarded the programme management contract to Egis. Under this contract, the Egis Group was responsible for managing all the operations for 48 months.

"Egis had the overall responsibility for managing, monitoring and executing the 22 projects comprising the smart city programme for Bhubaneswar. These focus on transport, with the creation of a cycle route to encourage citizens to cycle to work instead of using motor vehicles, on revitalising the urban area by redeveloping 40 hectares of land at the heart of the city to create a business centre, and on remodelling a green space along an existing watercourse that runs through the city.

Some projects will be "social" ones, such as the creation of a centre to accommodate homeless people and the construction of a public service centre housing a crèche, a library and more. These projects will also involve the creation of modern, smart infrastructure such as a connected system to manage the drinking water and electricity networks to supply residents of the city with utility services 24/7 using new technologies that will constitute a sustainable system," says Ashish Tandon, CEO of the India Business Unit.

Egis has developed great expertise in the area of the Smart City and has already worked on smart city projects throughout the world, such as Abidjan in Côte d'Ivoire. The Group also anticipates tendering for other smart city programmes in India, "those that will prioritise the quality of projects rather than the quantity," explains Ashish Tandon.

AIX-EN-PROVENCE: L'**AIXPRESS** IS IN SERVICE!

L'Aixpress, the first all-electric bus fleet operated in Aix-en-Provence was commissioned in September 2019. The first months of its operation have shown significant ridership levels, and demonstrated the high reliability of the vehicles and their recharging. This result is witness to a long-term endeavour from the teams of Le Conseil by Egis

Context

We have been working along with the Agglomération du Pays d'Aix and the Métropole d'Aix-Marseille-Provence since 2015, assisting them in the management of this major project for the area: L'Aixpress, the first all-electric bus line in Aix-en-Provence. This line won the second call for projects for "Urban transport outside the Paris area". It provides a reliable, rapid and regular service. Easily accessed and comfortable, it is connected with the other modes of transport.

Services

The teams of Le Conseil by Egis have been assisting the owner of the infrastructure throughout the design and implementation of the project:

- Assistance to the owner, project management, and budget monitoring
- Legal assistance to the owner, regulations, technical and quality aspects
- Development of the programme, selection of the project manager
- Assistance with invitations to tender
- Management of interfaces
- Preparation of the commissioning

We have also assisted the Régie Départementale des Transports des Bouches-du-Rhône - the line operator - with purchasing the rolling stock. The innovative motorisation of the vehicles (charging at terminal bus stations) presents a risk that had to be controlled. This is why Egis recommended a performance-based contract to the operator in order to make the manufacturer accountable for the good running of its transport system (available vehicles and charging infrastructure facilities). Likewise, Egis provided support to the operator for adapting the maintenance centre to the needs of these electricity-powered vehicles.

Our mission will come to an end in 2023 with the delivery of the ex-post socio-economic analysis.

KEY FIGURES

- **7.2 km**: length of the layout, of which 80% in dedicated corridors
- **7 minutes**: service frequency
- **9,000 passengers** per day
- **16 buses**, all-electric, with 50 km of range
- **3 minutes**: average recharging time for a bus at a terminal bus station

SAINT-BRIEUC: THE **TEO** (EAST-WEST TRANSPORT) **BRT SYSTEM**

The TEO BRT system is a new bus line that crosses the Saint-Brieuc conurbation from east to west over 8 km, with 21 stations located at 400 metres from one another.

The project is concomitant with that of a new multimodal exchange hub at the railway station of Saint-Brieuc, a project known as PEM that covers the development and equipment of the railway station and of the bus terminal.

The project is presently in its second phase with the second section of the TEO line, located in the city centre and characterised as follows:

- infrastructure made up of a dedicated corridor (a lane reserved for buses) and approach lanes that give priority to buses at junction entries and exits;
- priority given to buses at junctions;
- well-equipped stations (passenger information, ticket machines, etc.);
- optimal accessibility of stations and buses;
- efficient modal transfer from private cars to TEO, thanks to Park and Ride car parks and the competitiveness of buses against cars.

The other project in progress is that of the multimodal exchange hub of the railway station, which takes place in a context of major changes in the rail transport sector with the Bretagne à Grande Vitesse (High-speed Brittany) and Liaisons Nouvelles Ouest Bretagne-Pays de la Loire (New links between Western Brittany and the Loire Region) projects.

In addition to that, the project is accompanied by a programme for the repurposing and balanced distribution of urban and landscaped spaces.

3,500 m³
OF MATERIALS
resulting from the demolition of a school close to the site, and reused as fill

30,000 m²
OF EXISTING ASPHALT MIXTURE
planed and reused, to avoid supplies from the outside.

© Solenne Lesourd, © Saint Brieuc Armor Agglomération

4

Social and economic **inclusion** of all populations, integration of informal settlements acknowledging societal changes

WELL-BEING OF POPULATIONS

TACT

TO MINIMISE NUISANCE AND DISRUPTION GENERATED BY URBAN WORKS

A huge project was launched in May 2018 to provide the city of Saint-Brieuc in France's Côtes-d'Armor département with its first dedicated bus rapid transit lane. This Transport Est-Ouest (TEO) project is also providing an opportunity for the city to revitalise its city centre by repurposing iconic spaces such as the square on the Charner side of the station, the Place du Guesclin and the Les Champs shopping centre.

Handing the floor to locals...

To support local residents and enable them to enjoy everyday life during this uncomfortable interlude, the Egis teams, in conjunction with the services of the conurbation and the city, CEREMA*, and the transport operator, proposed using an innovative approach to contribute to the smooth local and social integration of the project. A wide preliminary consultation was held using multiple formats for participation: public meetings, urban walks to collect local opinions, digital platform, "TEO" cafes, work in schools, etc.

...and taking their needs into account.

As a result of this upstream work, the constraints of accessibility and the requirements expressed by local businesses and residents could be taken into account on the construction site. Alerted by Egis to the expectations of the residents, the contractors involved, Eurovia Vinci and Colas, took particular care to limit nuisance from the site: restricted works at night and in August, keeping traffic flowing, signing, etc. Site works were also punctuated by local events (e.g. street art for the deconstruction of the footbridge), which were relayed through a dedicated information campaign (mailings, monthly meetings, visits). All concerned parties have recognised the exemplary approach and acceptability of the work and the site.

Known as TACT, the method rolled out by Egis aims to turn the constraints of worksites into an opportunity for developing and promoting the urban space. "We position the question of discrete works at the heart of the process of designing and undertaking urban projects", explains Solenne Lesourd, Project Director for Egis. "It is not only a question of being interested in the end result of the project, but also its production process, in other words the site itself. In the same way, city dwellers must no longer be seen merely as the end beneficiaries of a project, but rather as users of the city who must be shown consideration throughout the works."

* Centre d'études et d'expertise sur les risques, l'environnement, la mobilité et l'aménagement (French Centre for studies and expertise on risks, the environment, mobility and urban planning)

© Solenne Lesourd

LES MUREAUX: **URBAN RENEWAL** PROJECT

Launched in 2006, the project has restructured the whole of the urban network and public spaces within the scope of the programme of the French national agency for urban renewal. A street-by-street landscape project ensured that stormwater issues were addressed well in advance, in accordance with the site's irregular terrain. As the project's centrepiece, the Molière gardens give structure to the whole of the urban fabric. Currently under construction, they will be delivered in 2017. With the reopening of a waterway and the creation of filtering gardens, the planting of orchards and kitchen gardens, plus play areas and meeting places, this landscape environment will become the backbone of a rediscovered urban conviviality.

The town of Les Mureaux, SEM92, Atelier Villes & Paysages and Infraservices were awarded a prize by Innovapresse – Les Défis Urbains 2016 (Urban Challenges 2016) in the category "climate adaptation of the urban landscape and water management" for the Les Mureaux urban renewal project.

The Défis Urbains awards recognise the achievements of public and/or private initiatives for a sustainable, inclusive, accessible, shared, innovative, connected, balanced, comfortable and economical city.

CAMBODIA: **SUSTAINABLE DEVELOPMENT** OF **3 CITIES**

The project, funded by the French Development Agency (AFD) contributes to the sustainable development of three secondary cities: Battambang, Kampot and Kratieh-Chhlong.

Project overview

The criteria for selection of these cities are to better balance the regional development, to strengthen city centres for the benefit of large regions and to enhance the specific tourism potential of their unique heritage.

The specific objectives of the project are the following:

- To define a coherent urban project to drive the sustainable development of city centres;
- To upgrade utilities and public services for the benefit of the population and reduce flooding vulnerability in dense urban areas;
- To foster the attractiveness of city centres in order to reduce urban sprawl and promote low carbon mobility and sustainable tourism;
- To reinforce local economic development and support job creation for women and men through fostering local knowledge and capacities, local production and creativity;
- To consolidate local governance at all scales by updating and strengthening the legal and regulatory frameworks, and urban management capacities with a focus on the opportunities for women to join the teams;
- To facilitate partnerships between local authorities, the private sector and the inhabitants for better living and working conditions and seize the opportunities inhering in natural and urban heritage to develop economic activity.

Our missions

The services provided by Egis include a feasibility study to identify actions to be implemented in each of the three cities:

- To define a spatial and thematic perimeter for action.
- To define management and governance tools for the project at the local and national levels.
- To evaluate the budget required for implementing the various components of the project.

Egis provides diagnosis and feasibility study on several technical components adapted to the context and needs of each city. The works anticipated include the rehabilitation of utilities, works on riversides and rehabilitation of old bridges, the development of high-quality public spaces, the enhancement of heritage buildings, capacity-building for urban management and support for economic activities, notably in the field of culture and tourism.

DATE	DURATION
July 2019	9 months
CLIENT	**FUNDING**
Ministry of Public Works and Transport (MPWT)	French Development Agency (AFD)

MONS-EN-BARŒUL: **URBAN REGENERATION** OF THE CITY CENTRE

The project consists of the urban regeneration of the Mons-en-Baroeul urban development zone, which was built during the 70s. The project won a Grenelle de l'Environnement award in the "global ecological approach" category.

Designed with the goal of urban, architectural and environmental quality in mind, this project meets the challenges of social and urban diversity, ecology and biodiversity, soft mobility and accessibility for all.

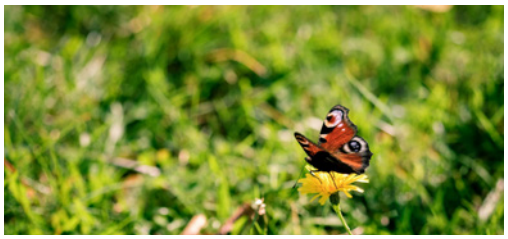
It is focused on improving the quality of life for the district's 12,000 inhabitants, providing accommodation that offers greater quality and comfort, and increasing energy efficiency and social diversity.

The quality of the landscaping of the public spaces has been prioritised and action has been taken to encourage waste sorting and raise residents' awareness of biodiversity.

The aim of the reorganisation of public spaces will be to mitigate the effects of the discontinued urban fabric that contributes to the isolation of the heart of the district, to create a central hub, and repurpose spaces that have been ignored since they were created.

We have also participated in the deconstruction of the Bouleau, Sorbier and Marronnier buildings and the conversion of the Chêne, Érable, Tilleuls and Bartoldi buildings into residential units. This corresponds to about **350 residential units renovated and 80 newly built**.

2 hectares	**1.2 hectares**	**0.8 hectares**
of pedestrian pathways	of parkland created	dedicated to soft modes of transport



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5

Optimizing performance for urban flows (mobility, energy, waste, water, food, etc.), with digital solutions serving the city-system

CARBON NEUTRALITY

WELL-BEING OF POPULATIONS

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

THE SECRET WEAPONS OF **CYCLE UP**

Materials account for 56% of a building's carbon impact and 70% of waste production in France

CHANGE THE RULES WITH **Cycle Up**, AN ONLINE MARKETPLACE FOR MATERIAL REUSE

Egis and Icade have created Cycle Up, an innovative marketplace that brings together the supply and demand for materials, and connects those working in the field for the reuse of building materials.

A TWOFOLD BENEFIT

AN IMPACT ON PROJECTS

- **DECREASE** in carbon impact
- **REDUCTION** in waste production
- **SAVINGS** of non-renewable raw material
- **DECLINE** in building costs
- **COMPLIANCE** with the new regulations and the new labels

A TOOL FOR THE REGIONS

- **DECREASE** in the amount of waste to be treated
- **FEWER** imports of raw materials
- **RELOCATION** of materials supply
- **CREATION** of non-relocatable jobs
- **DEVELOPMENT** of the social and solidarity economy

Learn more about www.cycle-up.fr

cycle up
DES RESSOURCES À L'INFINI

© alex-jones

SACLAY: **DISTRICT HEATING AND COOLING NETWORK**
AT PARIS SACLAY CAMPUS

The Paris Saclay Urban Campus is a major project in Greater Paris. With the planned 1.74 million sqm construction, it combines scientific ambition, economic development and sustainable management to strengthen the city's position among the global centres of innovation. This is a unique opportunity to develop a new energy model and make Paris Saclay an Eco-Area. Establishing a smart grid for low temperature cooling and heating using deep geothermal energy will help make Paris Saclay a positive energy area.

An Energy Transition plan

A solution in line with the energy transition law and COP21 to move from a society with high fossil fuel consumption to a society that is more energy and carbon efficient.

- A solution that has a carbon footprint three times lower than conventional gas heating
- Savings close to 20% for the subscribers

The project led by EPAPS is one of 11 winning projects in the "Industrial demonstrators for the sustainable city" call for projects, launched in October 2015 in preparation for COP21. The aim of this call for projects was to select operations intended to become a showcase for French excellence in sustainable development.

The Egis/IDEX consortium won the seven-year contract awarded by EPAPS with a transfer of skills in design, construction and operation/maintenance for the provision of heating and cooling in both joint development zones[1]. Egis is involved in the design, project management and turnkey implementation of the network within the scope of its association with IDEX.

The Egis/IDEX consortium proposed a temperate network via a geothermal doublet[2] tapping in Albian sands[3] powering the blocks' substations (distributed generation). This provides heating and cooling to the blocks, thus avoiding the need for extra/emergency gas resources in the buildings of the lessees. This system is also able to adapt to changes in the programme at block level.

1 Corresponding to two strategic districts on the urban campus: that of Vauve (École Polytechnique) in the towns of Palaiseau and Saclay, and that of Moulon in the towns of Gif-sur-Yvette, Orsay and Saint-Aubin.

2 The doublet technology helps protect the environment and ensure the sustainability of water resources. It consists of two boreholes, one for production and one for the re-injection of thermal water into its original water table.

3 The Albian aquifer measures over 100,000 km², with an average depth of 600 m, protecting it from surface pollution. Its estimated temperature of between 25°C and 28°C makes it a vital source of geothermal energy. The Albian water table extends beneath the entire Paris Basin.

MANAGING A CITY **THROUGH** ITS **LIGHTS**

PUBLIC LIGHTING, PROVIDING URBAN SUPERVISION AND SAVINGS

Public lighting, whether in the creation or renovation of a network, carries a current that can connect and therefore centralise data. Whatever its source, this data can contribute to urban performance, with operating savings achieved made available for reinvestment. Public lighting thus becomes "intelligent".

Our expertise

- "Lighting" diagnoses
- Current situation and physical measurements
- Regulatory analyses
- Review, GIS database and technical proposals

"Power" diagnoses

- Systems audit
- Functional analysis
- Analysis of development potential

Lighting master plans

- Identification of needs and objectives
- Planning of photometry and temporal objectives
- Framework for evaluating energy savings

Legal and financial expertise

- Financial and contractual packages
- Design and development of operating contracts
- Legal and regulatory strategy

Remote management of various technical equipment

- Functional analysis
- Hardware and software architecture: central system, remote equipment, transmission networks
- Management of KPIs

Development of specifications

- Monitoring and creation of the different systems
- Procurement assistance for works contracts
- Launch and monitoring of the system's operation

MAKING LIGHTING SMARTER

Public lighting accounts for 18% of consumption and 22% of energy expenditure for local authorities. With a little over 5.3 billion kWh, street lighting is the number one source of municipalities' electricity consumption (45%) and expenditure (38%). (Source: Ademe) In order to reduce this electricity consumption, the best solution would be to implement a coherent methodological approach, without harming its two fundamental objectives, which are the comfort and safety of users. These savings can be made possible by capitalising on the power line.

OPT FOR **SMART PARKING**

The challenges

Major problems related to on-street parking

- 20 to 30% of motorists on the road are looking for a parking space
- +13% of greenhouse gas emissions related to traffic congestion by 2030

Our solution:

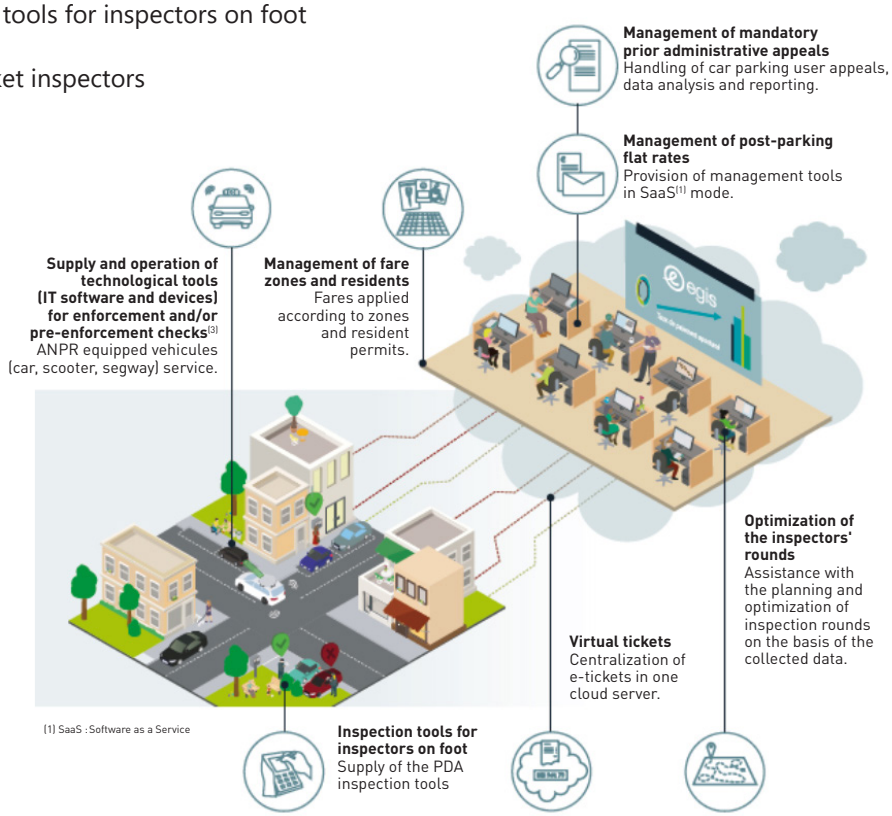
- pre-inspection tools by ANPR vehicle
- management of parking zones and residents
- management of mandatory prior administrative appeals
- management of post-parking flat rates
- parking ticket inspection tools for inspectors on foot
- virtual tickets
- optimised rounds for ticket inspectors

Since October 2015, Egis has been in charge of managing on-street parking in the city of Amsterdam, which represents:

- 2,400 parking ticket machines managed by Egis
- 180,000 resident permits managed by Egis
- 1,200 cars checked per hour and per ANPR vehicle
- 61,650 appeals managed by Egis

Results?

85% visitor payment



(1) SaaS : Software as a Service

BRAZIL: **"SMART CITY" APPROACH** IN **FOUR CITIES**

Egis, on behalf of the French Development Agency, will be supporting the cities of São Paulo, Recife, Curitiba and Belo Horizonte in their transition to smart cities.

As part of a cooperation program, the French Development Agency is capitalizing on experience acquired in smart city projects in France to support the four Brazilian cities in developing strategies and innovative projects suited to their local issues.

The method: adapting French technological and organizational innovations to the needs of the Brazilian cities and amalgamating them with local digital initiatives so that the cities become more inclusive and sustainable. Given that 80% of Brazilians now live in built-up areas, 20 of which have over one million inhabitants, this is a huge challenge.

During the next two years, Egis will support these four Brazilian cities in various innovative aspects such as open data strategies, centralized urban management using big data and an urban hypervisor (a platform that centralizes data on transport and urban services), and smart mobility solutions.

The participating cities will therefore benefit from a hub of common knowledge incorporating lessons learnt in France: study trips to French communities, organization of hackathons in Brazil (collaborative project-related competitions with associated training), workshops, UX design (design generated from user experience), training seminars and pre-feasibility studies etc.

In addition to being able to share the French experience, this project will also provide the technical teams from the four Brazilian cities with tools and operational knowledge that will help them to define and implement their short-term projects.

An opportunity for the Egis group to demonstrate its experience in the areas of sustainable cities and smart mobility, which is already having an effect in Brazil. Egis is already supporting the city of São Paulo in improving its road traffic flow and manages the traffic control center in the city of Jundiaí (São Paulo State). It is also assisting São Paulo State in the day-to-day operation of almost 2,500 km of its road network.

6

Mixed-use neighbourhoods
(housing, business, shopping, crafts,
industry, agriculture, tourism, leisure, etc.)

CARBON NEUTRALITY

WELL-BEING OF POPULATIONS

PARIS: DEVELOPMENT OF **CHAPELLE CHARBON**

Paris & Métropole Aménagement has selected the urban, landscaping & collaborative project management team for developments in the Chapelle Charbon ZAC (joint development zone),

This new development programme for the 18th *arrondissement* of Paris takes place in the North-East of the city. The Chapelle Charbon programme is unusual in its enclosed location and the fact that it will be implemented in stages.

It will enable the opening up and inter-connection of the new districts in north-eastern Paris developed between the Porte de la Chapelle and the Porte d'Aubervilliers. The challenges of energy transition set out in the new Climate, Air and Energy plan of the City of Paris and the objectives of conserving and recovering resources identified in the impact study will be incorporated into the project at a very early stage and in every subsequent phase.

The first phase in this district provides for 13,500 m² of public and landscaped spaces and 35,000 m² of floor space for building programmes. Paris & Métropole Aménagement is looking to initiate a dynamic that involves and combines all the project dimensions, stages and stakeholders. It also involves implementing a tailored and collaborative approach to town planning, fully integrated with the development of the urban planning and landscaping programme and entrusted in part to the project management team.

A park will be inserted between the blocks of buildings, helping to redefine and link them in a finely-tuned articulation between the new programmes and the existing buildings. The introduction of activity at ground level will enable the creation of a new urban facade for the district that includes the park.

The collaborative approach will enable the involvement of local residents and users in the design of the project as soon as it is launched.

Noteworthy amenities

- Park: 6.5 hectares (3 hectares delivered in 2020)
- Public spaces: 13,500 m² of roadways and landscaped spaces

Property

- Residential buildings: 28,200 m² of floor space
- Activities and shops: 2,500 m²

Public amenities

- 1 school complex (12 classes) and municipal premises

©Sergio Grazia

MARSEILLE: "**LES FABRIQUES**" PROJECT

The Établissement Public d'Aménagement Euroméditerranée (Euroméditerranée development public body) has just awarded the project management contract for the "Les Fabriques" public spaces on the edge of the Euroméditerranée extension to the consortium made up of Ilex (leader), the urban development activity of Egis's Cities, Roads and Mobility Business Unit (VRM BU) and Strates.

This six-year framework contract will support the creation of a new district on a brownfield site and in the continuation of the urbanisation of the districts of La Joliette - where our Marseille agency is located - and Arenc, the project management of which is already being performed by the urban development activity of the VRM BU in a consortium with Stoa.

The operation extends over **14 hectares**, and involves the creation of **250,000 m² of floor area** (accommodation, shops, activities, public amenities). It is being developed by the Bouygues Immobilier – Linkcity (Bouygues Construction) consortium.

In addition to the project management of the public spaces, Egis will be responsible within the consortium for:

- BIM Management and the design of the public spaces using BIM;
- The innovation and sustainable development initiatives (decontamination, waste management, mobility, smart city, rainwater management, innovative materials, incorporation of the sea water circuit, etc.);

giving us the opportunity to demonstrate new ways of building the city of the future and testing them at district level.

19,400 m³ OF MATERIALS required for backfill come from the site

9,000 m³ OF POLLUTED SOIL TREATED on site with a view to its reuse

6,000 m³ OF DEMOLITION CONCRETE RECYCLED for reuse in road foundations

© AJOA - Joyland

CONGO: **FOOD PROGRAM**

RESETTLEMENT, SOCIO-ECONOMIC SUPPORT AND MAINTAINING OF LIVING CONDITIONS OF GROUPS OF MARKET GARDENERS ON SECURE LAND IN BRAZZAVILLE

In 2018, as part of the construction of the Brazzaville corniche road and urban development in the Bacongo and Makélékélé districts, a large number of market gardeners had to leave the production area.

The environmental and social management plan had identified 1.600 market gardeners who would be impacted by the construction of the road.

Socio-economic studies have shown that rural cropping systems and peri-urban cropping systems supply cities with different vegetables in a complementary manner: the advantage of the peri-urban production system is for perishable and temperate type vegetables for which access to inputs and technical support is facilitated. The advantage of the production system in areas more distant from urban centres is that it offers low-margin products whose quality is not affected by long journeys and for which extensive production is of interest to rural populations.

The French Agency for Development (AFD) ensured that the setting-up of the Market-Gardening Support Plan (PAM) would be a prerequisite for the starting of the works in order to improve food safety in urban centres. The PAM, which consists of formulating a programme in which market gardeners are supported, was based on a diagnosis and a 24-month implementation.

The Egis team worked on the institutional strengthening of the market-gardener associations; the implementation of the proposals approved by the stakeholders (in particular the main one which consisted in resettling the market-gardener associations on secure land through land titles); the implementation of the land component; the definition of and support to the mechanism for financing market gardening services through the involvement of micro-finance institutions (MFIs) and the implementation of a guarantee fund; finally, the monitoring of measures.

- Relocation and resettlement of 1,600 market gardeners based on consultation of resettlement arrangements
- Implementation of financing solutions via local MFIs with a CFAF 100 million credit-backed guarantee
- Total surface area of the market gardening areas to be reinstalled: approx 40 ha
- Maintaining living conditions of 1,600 market gardeners and support in their resettlement process
- Support for the organization and formalization of 5 market garden cooperatives of several hundred members
- Support for local production of fresh vegetables covering 3-4% of the capital's needs

7 **Risk-resilient** design and operation

CARBON NEUTRALITY

WELL-BEING OF POPULATIONS

SENEGAL: **FIGHT AGAINST THE EFFECTS OF CLIMATE CHANGE** IN SAINT-LOUIS

The coastal city of Saint-Louis is today under threat from the effects of climate change. Egis and its partner Deltares have been appointed to assist the Senegal Municipal Development Agency (ADM) in the sustainable and resilient development and planning of this city registered as a UNESCO World Heritage site.

Located on the Senegal River estuary, the city of Saint-Louis is exposed to the risk of coastal erosion, compounded by the effects of climate change and the risk of flooding in the delta where flows are very powerful during rainfall. Saint-Louis' only protection from the ocean is the Langue de Barbarie, a thin, sandy peninsula that has been undermined by the actions of mankind. In this context, people and dwellings are exposed and vulnerable, most notably in built-up coastal zones.

Working in association with Deltares (an independent Dutch institute for applied research in the field of water and subsurface), Egis will assist ADM up until 2021 to alleviate this situation and recommend sustainable and resilient planning for Saint-Louis. Several scenarios will be put forward comprising technical, economic, environmental, social and institutional components.

This assignment is an application of the studies into the impact of climate change on land and sea infrastructure and on the management of urban zones: comprehension of the issues, design of maritime and river modelling tools, development of a sustainability and urban resilience strategy.

In particular, river and sea models will be developed and calibrated based on the findings of three on-site surveys (swell, current, salinity, morphology, bathymetry, Lidar topography) covering the phenomena of river and coastal hydrodynamics, wave propagation, the impact of storms on the coastal fringe, and how the coastline is changing.

This contract is part of ADM's implementation of the storm water management and climate change adaptation project and the Saint-Louis emergency recovery and resilience project, financed respectively by the Nordic Development Fund and the World Bank.

The project is a prime example of our longstanding commitment in the fight against climate change which lies at the heart of our strategic development priorities for the coming years.

8

Safe and hospitable public spaces,
equitably distributed, pedestrian-oriented,
and beautifully landscaped

WELL-BEING
OF POPULATIONS

RESPECT OF BOTH NATURAL
AND HUMAN LIFE ENVIRONMENTS

MONACO: AN **ECO-DISTRICT RECLAIMED FROM THE SEA**

Faced with the small size of its territory, the Principality of Monaco has launched a new offshore urban development project to create an eco-district on a six-hectare land reclamation site between now and 2025. Alongside the concessionaire, made up of Monegasque shareholders and the Bouygues group, Egis is designing all the maritime infrastructure for this major project.

Between the cove of Portier and the Grimaldi Forum, a new district is about to emerge, bringing the total area reclaimed from the sea to 40 hectares, some 20% of Monaco's surface area. A major challenge for the Principality! The construction of a six-hectare eco-district will not only help to revitalise Monaco's town planning, but also accommodate a rapidly growing population.

Egis is designing all the maritime infrastructure for this major project. Hydraulic and geotechnical expertise were harnessed from the very first studies in order to identify the project's constraints. Seabed depth, geology, and the effects of the swell and seismic risks are just some of the many factors to be considered when establishing the sustainability of these infrastructures.

The study phase required constant interaction with the various project stakeholders, to ensure that all of the project's issues are incorporated at every stage of the work. In addition to the technical aspects, it is environmental considerations, which are of primary importance for the Principality, that guided the overall design.

The new coastline created by this extension will lie at the centre of two natural areas: the Larvotto Reserve and the Spélugues coral reef. "Measures will be taken to move and restore protected species (Noble pen shells, Posidonia seagrass, etc.) outside the project zone. There will be constant monitoring of the risks of turbidity (particles suspended in the sea) during the construction phase. Finally, being mindful to protect biodiversity, the façades of the caissons have been specially designed to be able to host marine fauna and flora.

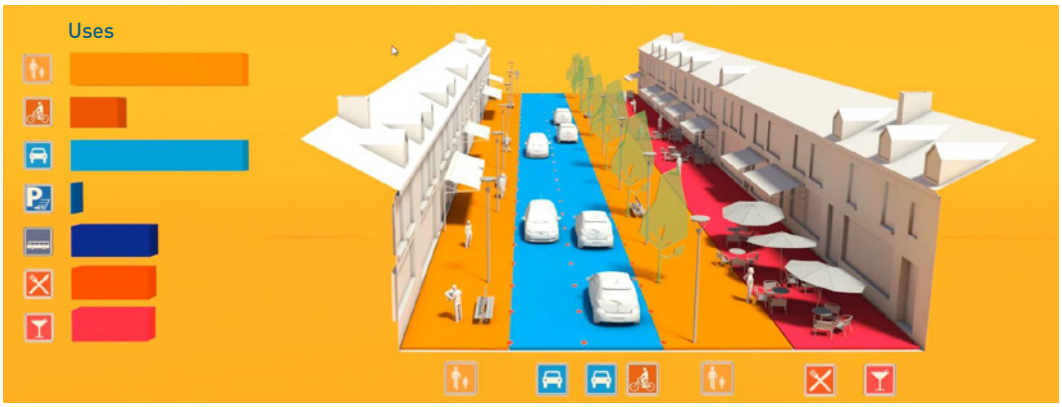
© Manjik - Istock

SHARED SMART STREETS

STREETS THAT ADAPT TO CHANGING NEEDS

How about we stop assuming that our streets have to be dominated by cars all day, every day? What if the street could be used for other things? Things we have not yet imagined... And what if we invented a flexible system so that our streets can constantly adapt to new uses? What if we set up Shared Smart Streets?

Based on the dynamic allocation of street spaces, the smart street solution is particularly suited to highly restricted spaces within which we find seemingly incompatible and high intensity uses. It helps reconcile the uses and traffic capacity of the street. To avoid public spaces constantly becoming obsolete due to their inability to **develop at the right pace**, Egis has developed a **design approach** that **makes public space scalable and which facilitates the expression of community life and living together within the city**.



LYON: **DEVELOPMENT** OF THE **PART-DIEU DISTRICT**

Completion of project management design studies for public spaces within the perimeter of the Part-Dieu multimodal transport exchange hub:

- making provision for soft transport (cycles, pedestrians, scooters etc.)
- using specific lighting for pedestrian traffic in the zone thanks to specially-designed street furniture
- facilitating the infiltration of rainwater whilst taking into account the constraints of the subsoil (permeability of existing soil, presence of networks, match between surfacing materials and expected uses, management constraints etc.)

Strategic design choices (colour of materials, permeable surfacing, evapotranspiration of trees etc.) reduced the heat island effect, improving user comfort in the area, through which thousands of travellers pass every year.

93
BEDS
planted with shrubs

3,500 m³
EARTH/STONE SOAKAWAYS
for rainwater drainage

600 m³
OF DIFFUSION LAYER
for the rainwater that does not need to be discharged into the network and can therefore be used to irrigate the beds directly

COURBEVOIE: **PUBLIC SPACES** IN THE **DELAGE DISTRICT**

Opening up of a former 3.2-hectare industrial site and its transformation into a multi-purpose dynamic, friendly and high-quality eco-district with ambitious landscaping and environmental goals:

- implementing alternative management of public spaces by limiting and regulating discharges to the drainage system, building reservoir pavements using porous asphalt, managing rainwater at source, increasing permeable surfaces and routing rainwater from roads to green spaces;
- factoring in the carbon footprint through the reuse of materials and the use of bio-sourced materials, and highlighting the site's industrial heritage;
- being vigilant as to the use of future resources through tailored, well thought-through lighting and a carefully planned watering scheme;
- choosing eco-responsible urban furniture.

12,000 m²
PERMEABLE OR SEMI-PERMEABLE SURFACE
out of 26,000 m² developed

7,000 m²
OF POROUS SURFACING
out of 21,000 m² developed

©Ville de Courbevoie

9

Natural green and blue urban patterns with **infrastructures that reconnect** (and are no longer barriers)

WELL-BEING OF POPULATIONS

RESPECT OF BOTH NATURAL AND HUMAN LIFE ENVIRONMENTS

BIODIVERSITY FLASH DIAGNOSES

The city is an entirely artificial environment, constructed, maintained and continually transformed by humans. Nevertheless, it is still home to biodiversity of varying levels and quality, and partially connected to the regions which surround it. Every development that modifies spaces with a natural character: afforestation, public parks, private gardens, vegetable gardens, tree alignment, ground-level areas, roadsides, green buildings, etc. disrupts the fragile balance of the living world in the city.

Positive biodiversity actions with Icade

Apart from the obvious, intrinsic value of biodiversity, it also makes a significant contribution to the comfort and living environment of the city's inhabitants. A few cool areas for the summer heat, some recreational spaces for the community, that kind of thing. But also, a visual and sound environment that everyone can enjoy. Not to mention the regulation of water flow, which plays a crucial role in flood protection, air quality, and so on. That's why, before every Icade property development, our Environment teams carry out a flash diagnosis to assess the biodiversity on the building plot, so this can be taken into account in the design of the real estate project. This approach should be continued during the life cycle of real estate projects for important ecological added value.

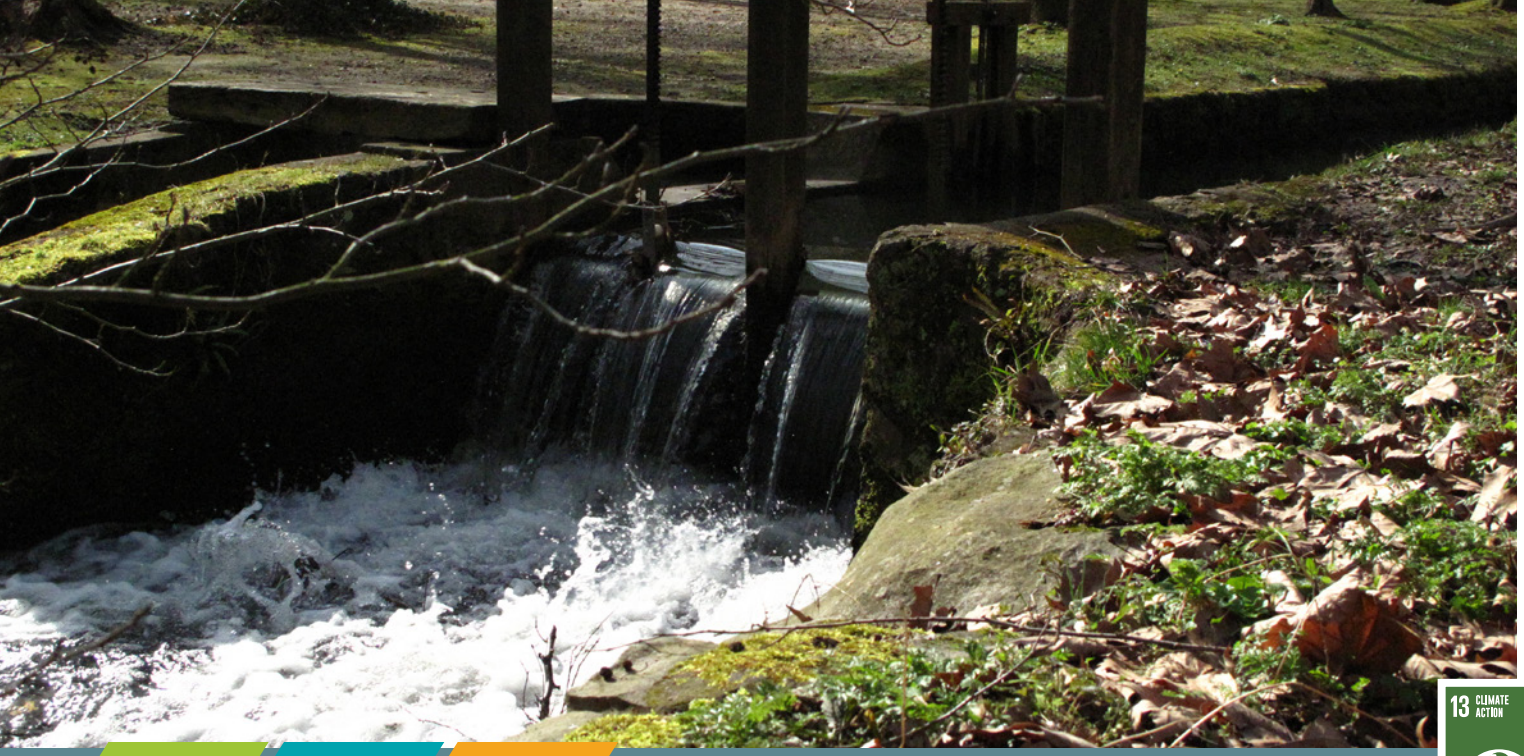
The Biodiversity Flash Diagnosis is a method specifically developed by the Egis Biodiversity teams to support ICADE in its proactive approach to developing new real estate projects with positive biodiversity. Based on the analysis of several specific criteria, the methodology is used to establish a suitable ARC (Avoid, Reduce, Compensate) strategy for biodiversity on the site:

- Field diagnosis
- Recommendations for a project with positive biodiversity

The analysis focuses on the following criteria:

- Main features: land use, topography, hydrography
- Ecological context: protective or inventory zoning, permeability (CBS), habitat/wildlife diversity, connectivity, etc.
- Summary of regulatory issues and risks: regulatory risk, protected species, wetlands, land clearing, etc.
- Assistance to project developers: The Biodiversity Flash Diagnosis is a pledge to any property developer of the feasibility of their project with regard to the regulatory challenges and constraints specific to biodiversity, in light of the growing importance of the issue. It is also a fantastic opportunity to raise project developers' awareness of best practice for biodiversity, both in terms of planning and managing natural spaces.

A specific project team has been set up to ensure an "agile" response and intervene in very fast time frames.



ECOLOGICAL RESTORATION OF **RIVERS**

The example of the Mérantaise

In Gif-sur-Yvette (French département of Essonne), renaturation work along almost two kilometres of the Mérantaise river has been completed. This work will promote ecological continuity as well as combating flood risk. It was the frequent floods caused by the Mérantaise river, a tributary of the Yvette, that inspired the project. In 15 years, the city of Gif-sur-Yvette has experienced five natural disasters.

Thanks to this rehabilitation, the river can now absorb a fifty-year flood.

A left-bank tributary of the Yvette, the Mérantaise was identified as a still largely pristine river. In this respect, it was classified as a biological reservoir and still hosted functioning populations of brown trout (Salmo trutta). The downstream section of the Mérantaise was partitioned by numerous hydraulic structures, with a resulting negative effect on ecological continuity. Concerned about the impact of these works on the overall functioning of the river, the SIAHVY (Intermunicipal Association for the Hydraulic Development of the Yvette Valley) decided to implement an ambitious operation to restore ecological continuity. Egis provided full EPCM services along with Sepia GC (for the geotechnical side).

- Six hydraulic structures, sluices in particular, were removed
- 9 metres in height difference were put right
- the bed of the Mérantaise was placed back at the bottom of the valley
- forestry work including felling and pruning accompanied the creation of a wet meadow bordered by groves of ash trees and willows (beneficial to all: walkers, animals, plants). We are now expecting to see the return of animals who favour these ecosystems, such as the wagtail, the Sedge Warbler, the Green Frog, and more.

With the rehabilitation and expansion of the stilling basin, the river can now absorb a fifty-year flood.

© Bored_Grrl, © Egis

SMART ENVIRONMENTAL SYSTEM TO TRACK THE STATE OF THE ENVIRONMENT IN REAL TIME

Smart Environmental System is an innovative tool for real-time monitoring of the state of the environment. Suitable for construction sites, industrial sites, infrastructures, business parks and urban areas, it allows owners to better fulfil both regulatory requirements and demands from local residents, who are increasingly involved in the quality of their living environment.

The aims of the approach

- Performing real-time monitoring using sensors, or predictive modelling of all the potential environmental and health effects of a project or site in operation.
- Monitoring multiple parameters simultaneously, such as weather, air quality, odours, water, soil, noise-vibrations, light pollution, electromagnetic waves, fire, photo surveillance, operating data of equipment, and more.
- Communicating these measures locally among residents and all non-institutional stakeholders (associations, neighbourhood committees, etc.) and taking into account the disruptions and feelings expressed.
- Reporting relevant environmental indicators to administrative authorities.
- Enabling the adaptation of processes and procedures by highlighting links between production indicators and the environmental indicators observed.

Fields of application

- Building and public works sites
- In-service transport infrastructure
- Urban sites / Smart cities
- Industrial sites
- Waste treatment facilities
- Mines and quarries

The process

- Defining the parameters: The environmental parameters to be monitored are defined in consultation with the client, as well as the terms and conditions for sharing information.
- Capturing and visualising data in real time: A network of autonomous geolocated environmental sensors continuously communicates the exposure levels measured to a WEB-GIS platform (with contextualisation by observatories in place).
- Forecasting and warning: A forecast module is used to simulate and model the state of the environment three days ahead. A "responsible" warning module sends text message/email notifications when environmental thresholds are exceeded.
- Communicating: An online/mobile interface (SMS/email) allows residents to report any discomfort felt and the owner to inform residents in real time.
- Reporting the results that will allow for the following:
  - Detect events, anomalies and thresholds being exceeded in real time, analyse the possible causes of these events and alert the appropriate people to trigger the corrective measures,
  - Perform a detailed analysis of recurring events or trends in certain parameters using complex correlation and data mining algorithms to develop preventive measures,
  - Generate preconfigured reports presenting a selection of statistical tables, graphs and maps to illustrate observations made during a given period. These reports can be configured to respond simply and directly to the monitoring requirements of the different administrative bodies concerned.

Few projects

- Valor'Aisne: an air-odour observatory for a waste treatment site (France)
- SNCF: an air & noise observatory for the Lannemezan works site (France)

SAUDI ARABIA: **GREEN RIYADH** PROJECT

Egis has been awarded the "Program Management and Technical Support Services" contract for the implementation of the "Green Riyadh" strategy.

Project overview

Egis has been awarded the "Program Management and Technical Support Services" contract for the implementation of the "Green Riyadh" strategy.

With its name meaning "gardens" in Arabic, the city has lost its unique character due to the effects of urban sprawl. This is what led the Riyadh Development Authority (RDA) to introduce a program to strategically increase the quality and quantity of vegetation in urban and suburban settings. This will lead to the development of a planned interconnected network of natural and seminatural areas with other environmental features designed and managed to provide a wide range of ecosystem services.

In recent years, the city has developed "green project" infrastructure such as Wadi Hanifa, a 120 km valley passing through Riyadh, the diplomatic district, the historical King Abdulaziz centre, King Fahd Road and Salam Park. In spite of this, vegetation and tree cover only accounts for 1.51% and 0.41% respectively of the city surface area.

The project aims to increase green cover in Riyadh from 1.5% to 9.1% between now and 2030.

Through the greening of the city, the goals of this development contribute to issues common to many major cities in the world: improvement of quality of life, of the environment, development of sport and leisure, health and well-being, safety, participation, and creation of economic value.

Our missions

Egis is working on this project as programme management consultant to deploy the strategy and supervise several hundreds of projects involved in the programme.

This assignment includes:

- the control and governance of the strategy, including monitoring and coordination tools (IT, timeframes, budget, reporting, etc.),
- advice on regulations and governance,
- advice on design, through the preparation of design guides, the definition of the specifications to be included in the invitation-to-tender documents and design verification,
- preparation of the invitation-to-tender documentation and monitoring of service providers from upstream phases to construction and operation.

SAUDI ARABIA
RIYADH

CLIENT
Riyadh Development Authority (RDA)

DATE
2019-2022

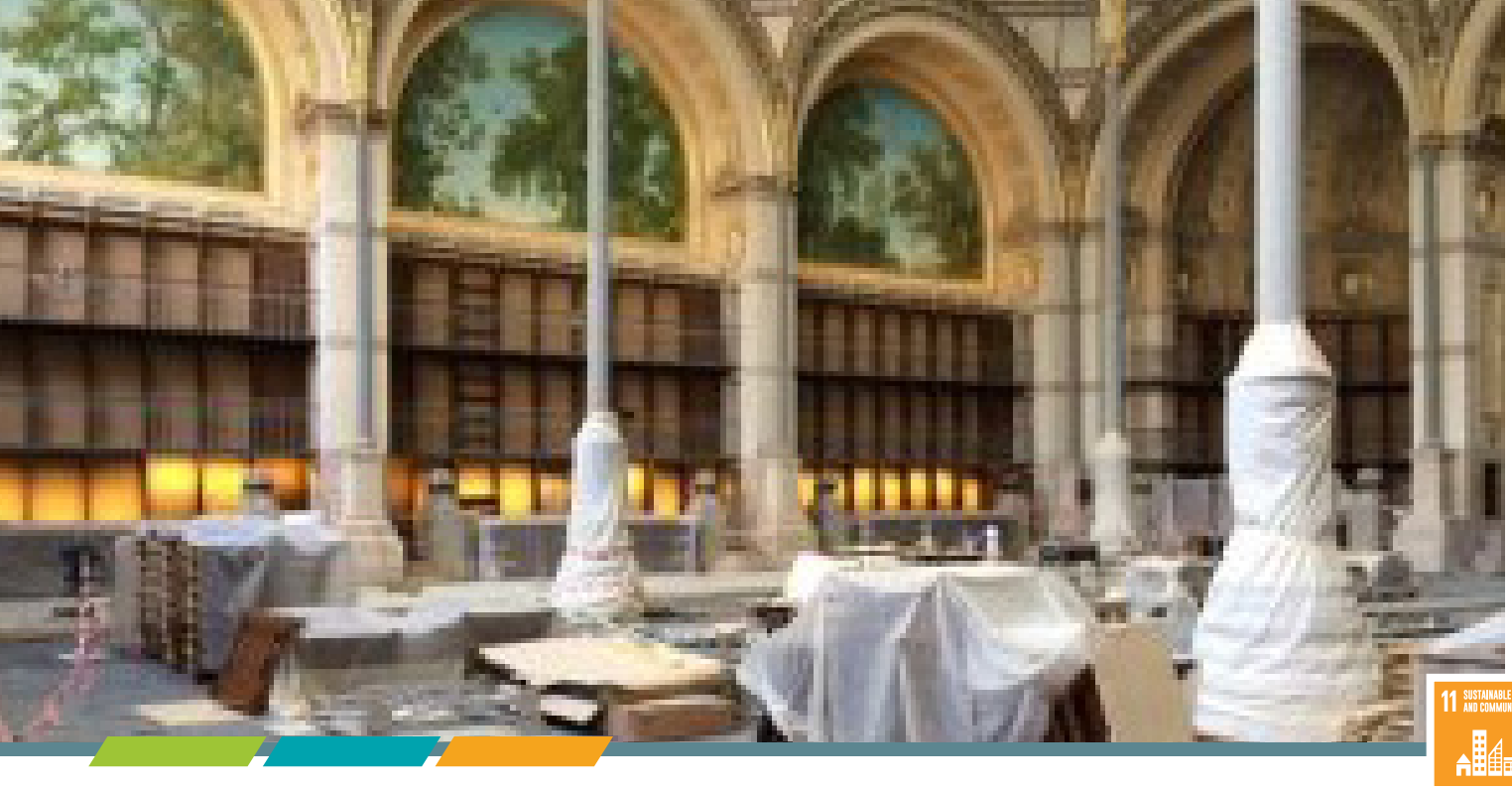
LANDSCAPE ARCHITECT
Cracknell

10

Cultural approach,
reinforcing identity,
character and heritage

WELL-BEING
OF POPULATIONS

RESPECT OF BOTH NATURAL
AND HUMAN LIFE ENVIRONMENTS



RENOVATING HISTORIC BUILDINGS

Renovating historic buildings is about highlighting their remarkable and timeless character through a process of renewal.

The Richelieu Library (the historic National Library of France) located in Paris's 2nd arrondissement, is a good example.

Partly located in Hôtel Tubeuf, a mansion built in 1635, the Richelieu Library is one of the sites of the Bibliothèque Nationale de France, a legacy of the royal library developed in 1666 under the direction of Colbert, in praise of Louis XIV. One of the challenges of renovating the library is revealing this architectural heritage and allowing the general public to enjoy previously inaccessible spaces. The project will be completed in 2020.

Egis is in charge of project management services for all trades on this site. Egis's digital and collaborative project management solution SGTi4 has been implemented on this project.

The Heritage Audit & Renovation department is an Egis entity in charge of existing buildings and heritage enhancement. It specialises in the diagnosis of existing buildings, recommendations for renovation projects, and the analysis of the development potential of buildings. The wide range of properties entrusted to it have enabled the department to work on buildings from all periods and of all types.The diversity of profiles within the team (Architects-Engineers, Specialist Engineers, and so on) means it can handle technical, functional and architectural components, while maintaining overall coherence, inherent to each project.

It carries out different types of assignments:

- Technical, functional and environmental audits
- Real estate master plans
- Transformation feasibility studies
- Renovation project management

Other iconic projects:

- The Samaritaine building (France – Paris)
- The Opera Garnier (France – Paris)
- The transformation of the Hôtel Dieu hospital into a 5* hotel (France – Marseille)

1.5°C PATHWAYS
EGIS'S CLIMATE COMMITMENT

AT EGIS, THE FIGHT AGAINST CLIMATE CHANGE IS A TOP PRIORITY.

To make this commitment a reality, three CSR[1] objectives have been established, directly inspired by our philosophy, to "imagine, design and create a sustainable world". Objectives 1 and 4 are linked to the Paris Agreement (COP 21). Egis is working hard to achieve carbon neutrality in its operations in 2050.

All the objectives are related to the UN Sustainable Development Goals (SDG), a shared blueprint for changing the world. Each of our Business Units is responsible for translating these objectives into concrete actions.

1. CSR: Corporate Social Responsibility

IMAGINE. CREATE. ACHIEVE.
a sustainable future

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SIE_VRM_10 | January 2022