

A global offer for construction and other major industries

CSTB operates worldwide to design and develop sustainable buildings and cities of the future

With CSTB, benefit from first-rate expertise leveraged from scientific and engineering backgrounds, extensive experience and know-how, for customized solutions.



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CSTB
le futur en construction

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A trusted and invaluable partner

«The Scientific and Technical Center for Building (CSTB) is a research and technology organization for building innovation. It provides support services to public and private stakeholders in construction and major industries, while fulfilling its public interest mission.

CSTB prepares for tomorrow's challenges by shaping the buildings and cities of the future, to meet societal expectations of sustainability, well-being and safety.»

Etienne Crépon
CSTB President



CSTB mobilizes its expertise around five key missions: **Research & Expertise, Assessment, Testing, Certification, and Dissemination of Knowledge.**

It supports stakeholders at each stage of innovation to ensure the safety and comfort of sustainable construction and renovation projects.



Drawing on cutting-edge expertise, CSTB drives the construction sector's ambitious transformation goals of **sustainable development, energy, environment and digital transition.**

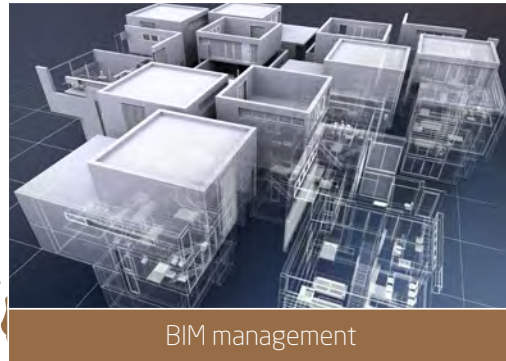
Society is evolving and citizens have higher expectations for an **enhanced living environment.** Forward-thinking, CSTB focuses not only on the **technical, energy and environmental aspects** of buildings and cities but also on **human health, comfort and accessibility.**

With a headcount of over 1000, the CSTB group (including subsidiaries, partners as well as national and international networks) creates **added value for construction professionals**, by optimizing the **quality and the performance** of their products, systems, infrastructure and services.

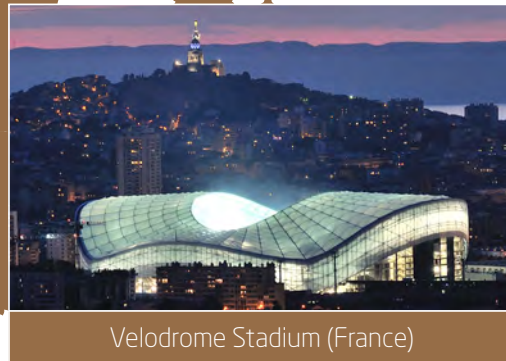
+ 1, 000 global references



Aerodynamic study of Ariane spacecraft (France)



BIM management



Velodrome Stadium (France)

- **Algeria** : Baraki Stadium, Grand Musée de l'Afrique
- **Bahrain** : JW Marriott Hotel
- **Canada** : Montreal metro
- **Colombia** : Professional trainings
- **China** : Wuhan train station, ecocities: Jilin, Panshi, Jingzhou, Qingyun, Foshan, Kaili, Yuzhong, Ninghe
- **Egypt** : Ismailia tunnel, Port Said Suez Canal Tunnels, Alexandria Stadium
- **Qatar** : Doha subway tunnel
- **France** : BIM Management, Eurotunnel, Viaduc de Millau, Grand Paris Station, La Défense, Stade de France, Stade Vélodrome Marseille
- **Greece** : Rion-Antirion bridge, Stavros Niarchos foundation
- **Italy** : Intesa Sanpaolo Turin, Genova port
- **Morocco** : Design of a new laboratory for hybrid daylighting systems, design of a building acoustics laboratory near Casablanca and Rabat

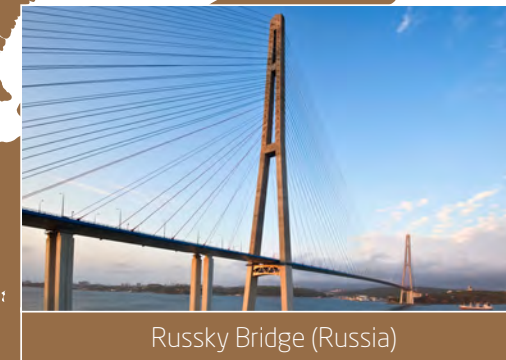


Grand Musée de l'Afrique (Algeria)

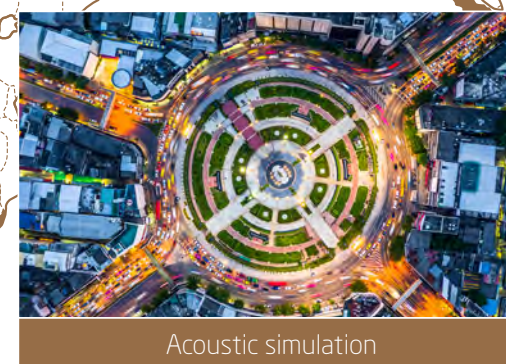
- **Monaco** : Hospital, Testimonio 2
- **Peru** : Interseguro Towers Lima
- **Portugal** : Vasco da Gama bridge
- **Russia** : Russky bridge, Straj Ural Towers



Vasco da Gama bridge (Portugal)



Russky Bridge (Russia)

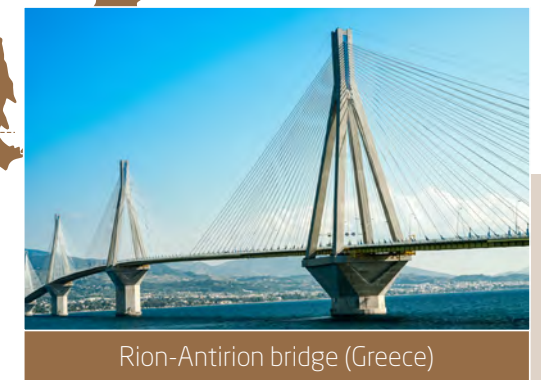


Acoustic simulation

- **Saudi Arabia** : Jabal Omar Tower
- **Switzerland** : Sargans Tunnel
- **Tunisia** : HQE project certifications



Port Said tunnel (Egypt)



Rion-Antirion bridge (Greece)



JW Marriott Hotel (Bahrain)

- **Turkey** : 3rd Bosphorus Bridge, Atatürk Olympic Stadium
- **USA** : Times Tower (New York)
- **Wales** : Tunnel of Conwy

Key figures

Located in France, CSTB exports knowledge and expertise all over the world.

**Headcount
as of 2019**
(excluding subsidiaries)

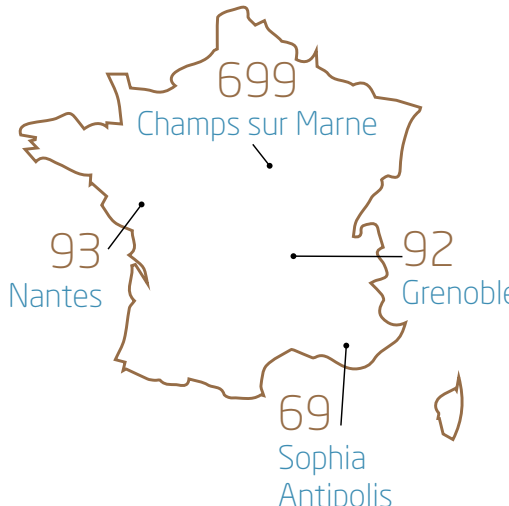
954
employees

Subsidiaries

6

**Full time
researchers**

189



Research and expertise

€ 24,7M

2019 operating income
(excluding subsidiaries)

€ 116M

Product certification

5,037 1,663
Active certificates Certification holders

CE marking certification

642 364
Active certificates Certification holders

Technological activities

99 767
ATEX (Technical Experimental Assesment) Technical Appraisals Technical Application Documents

Dissemination of knowledge

46,000
subscribers to technical and regulatory information services
146
available publications
80
digital publications

Did you know?

CSTB also operates worldwide with major industries

CSTB offers its expertise to major industrial actors, constructors and equipment manufacturers in numerous markets, testing vehicle performance under different climatic conditions. CSTB also provides improvements to their conceptual designs while evaluating consumer safety and comfort.

Railways

e.g. SNCF, Alstom, Railenium...

- Wind blowers: vehicle reaction studies
- Air friction resistance
- Severe climatic conditions



Automotive

e.g. Porsche, Audi, Mercedes, VW, PSA, Renault...

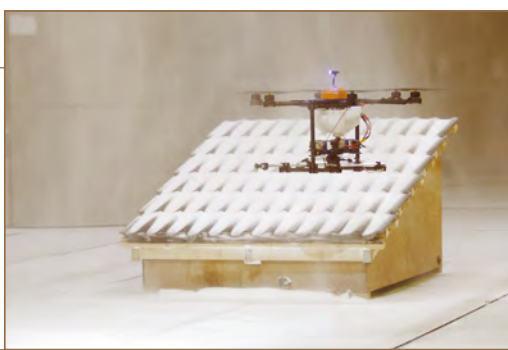
- Aerodynamics & thermo-aeraulics
- Aerothermic braking systems
- Competition vehicle optimization
- Vehicle bodywork and window water flows
- Disphasic phenomena analysis



Airplane, Aerospace and Drone

e.g. Ariane Group, Airbus Helicopter

- Flows visualization
- Vibration propagation
- Noise source mapping
- Aero-contamination monitoring



Defense

e.g. Naval Group, Army,

- Reaction to extreme climatic conditions
- Ventilation and hygrothermal conditions simulation
- Acoustic signature
- Thermic reactions testing



CSTB's exceptional test facilities

CSTB provides state-of-the-art test facilities comprising numerous test benches and large-scale equipment covering a broad range of scientific and technical fields. Located at CSTB's sites throughout France, these facilities handle testing of materials, products and components of building works for use in traditional or innovative construction systems.



Jules Verne climatic wind tunnel

- 6 000 m² and 3 200 kW
- -32 to 55°C
- Hurricane up to 280 km/h
- Snow, sun, rain, ice, fog, sandstorms, dust storms
- Humidity level up to 95%
- Turbulent air flow: 160 km/h
- Solar radiation and radiant flux (1 100 W/m²)
- Full scale adapted facilities (tanks, buses, cars...)



European laboratory of building acoustics (LBE)

- 2 000m²
- From 50Hz to 5 000Hz
- Overhead Crane of 15T
- Up to 25 measurements per day



Aquasim sustainable water management

- Total surface area of research and test facility: 2300 m²
- 4 storage basins (100 to 200 m³)
- 20 tanks (1 to 6 m³)
- 5 000 m² of land plots
- 7 km of piping
- 8 water treatment units

Vulcain furnace - fire test facility

- 2 500 m²
- Up to 13,5 MW
- Modular furnace: 9m high with a span up to 7m
- Horizontal furnace: 4m long, 3m wide with a mechanical span up to 5m
- Vertical furnace : 3m long and 3m high
- Up to 1 200°C



OTHER EQUIPMENT

- Eiffel wind tunnel
- PULSE (sensory assessment of products and spaces)
- Bioguess (biological hazards detections)
- Le Corbusier Immersive room (digital technologies)
- 5 Health & comfort laboratories (LMEI, Pollem, Maria, Mattei, Air'in)
- Leps (solar process test laboratory)
- Semi-virtual laboratory for multi-energy system assessment (software development, BIM, ...)

CSTB's multidisciplinary offering

From environmental transition, energy consumption optimization, digital revolution, smart cities, ramped up industrialization (factory assembly of structural components), CSTB is a major innovation driver for construction industries. CSTB likewise invests in highly innovative technologies, facilities and scientific, engineering, and technical experts.

As a global scientific and technical market leader, CSTB accompanies you every step of the way from project idea to realization, providing a highly professional value added service.

Our customer-oriented engineering teams provide you with optimum solutions ensuring rock solid support from a trusted and reliable partner for the smooth realization of your projects.

We operate at all levels of integration:

- from component to building
- from building to city
- from city to territory

CSTB supports you from idea to market



Study and design



Construction



Operation

Boasting scientific and technical expertise in specialized areas:

- Energy & Environment
- Water & Sanitation
- Construction & Economics Development
- Urban Planning
- Major Structures
- Human health
- Wellbeing

Process

- Project management
- Evaluations
- Innovation
- Research
- Development

Supporting your project at each stage

- Design & Initiation
- Definition & Planning
- Consulting & Strategy
- Launch and Execution
- Monitoring & Problem Solving
- Performance & Control
- Audit & Certification



CSTB's software technologies

The construction sector has embarked on its digital transition. CSTB actively contributes to the deployment of BIM and digital technologies by developing collaborative tools, software, partnerships and training programs.

ENVIRONMENTAL EFFICIENCY

- **Elodie** Software for global high performance of buildings

ENERGY EFFICIENCY

- **Cometh** Dynamic energy simulation calculation engine
- **Comenv** Environnemental simulation software
- **Meteonorm** Worldwide meteorological database
- **Tess** Component libraries for TRNSYS software
- **TRNSYS** World reference in the dynamic simulation of buildings and systems
- **ULYS** Thermal bridge calculation software

BIM

- **eveBIM** Free digital viewer for numerical building models
- **eveBIM-ELODIE** Digital model of the building for ELODIE

BUILDING ACOUSTICS

- **AcouSYS** Transportation and building multi-layer acoustic systems performance prediction software
- **AcouBAT** Acoustic performance of buildings predictive software

ENVIRONMENTAL AND URBAN ACOUSTICS

- **MithraSOUND** Software for the simulation of soundscapes in urban environment
- **MithraSIG** Acoustic mapping software

ELECTROMAGNETIC FIELD IN THE URBAN SPACE

- **MithraREM** Propagation of electromagnetic waves

ENVIRONMENTAL VIBRATIONS AND SOLID BORNE NOISE

- **MEFISSTO** Propagation of vibration in ground and structures

TRANSPORTATION ACOUSTICS

- **ICARE** Acoustic and electromagnetic 3D simulation in complex environments

Energy & Environment

Existing buildings generate more than 40% of end user energy consumption, 28% of CO2 emissions and more than 40 million tons of waste worldwide.

CSTB's scientific and technical excellence helps you find innovative solutions to reduce energy consumption, developing circular economy and waste management at different levels (buildings, city, district...).



STRUCTURAL DESIGN



FIRE SAFETY



HEALTH AND COMFORT
FOR BUILDING USERS



ENERGY, WATER,
ENVIRONMENT

SKILLS OVERVIEW

Supporting regional and local public policies

- Impact assessment
- Feasibility study
- Benchmarking both technical and environmental performance
- Developing building/district renovation strategies
- Circular economy implementation strategies
- Renewable and local energy implementation

Strategic consulting for construction projects

- High-level engineering in construction projects
- Cost-benefit and multicriteria analysis
- Multisensory comfort measure (PULSE)
- Assistance with operational implementation
- Assistance in selecting appropriate solutions
- Defect detection and risk management
- Structural analysis

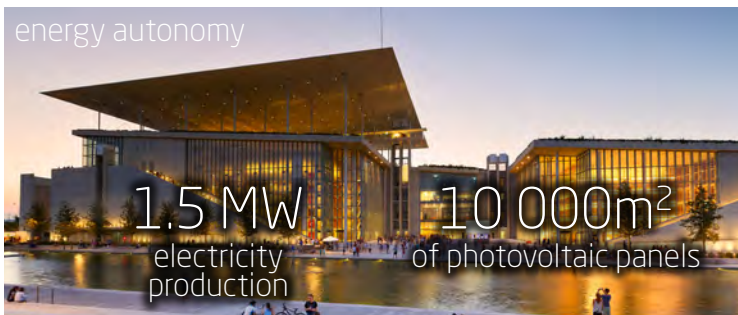
Stavros Niarchos Foundation Cultural Centre, Athens

Finding a balance between ecology and building

Located in a former Olympic site, it hosts an opera house for traditional and experimental performances.

CSTB uses a three-steps approach for this project:

- **Climatology study to qualify the wind and snow conditions**
- **Sizing of the main roof made up of photovoltaic panels**
- **Comfort of a pedestrian area made of a green roof and a park**



A 1 / 200th scale model of the project was tested in an atmospheric wind tunnel at CSTB : particular attention was paid to photovoltaic panels.

The aim was to guarantee the performance and resistance of these modules in the event of extreme conditions (heavy snow or wind).

Areas of expertise

OUTSTANDING ACHIEVEMENTS

- Stavros Niarchos Foundation Cultural Centre (Greece)
- SuPerBuildings program project (Europe)
- Transposing PEB directive (Kyrgyzstan / Moldova)
- Smart Energy Control (France)
- Smart-grid study (France)
- Grande Arche de la Défense (France)
- Saint-Denis Roland Garros Airport (Reunion Island)
- Analysis of pollutant dispersion

Saint-Denis Roland Garros Airport, Reunion Island

High environmental quality in a tropical climate

With a natural ventilation system at the center of the architectural choices, it is even more challenging to ensure user comfort, resistance to cyclonic wind and fire safety.

CSTB's expertise on this project includes:

- **Natural ventilation study and wind management study based on a 1/150 scale model**
- **Digital simulation of fire and smoke extraction study**



Water Management & Sanitation

Providing people with drinking water, maintaining ecological balance and improving water and sanitation networks, are the main challenges facing construction stakeholders and local authorities.

From building components (piping, fixtures, etc.) to cities, CSTB mobilizes exceptional experimental resources to tackle water management at different levels.



PIPING



DRINKING WATER



GREY WATER



WASTE MANAGEMENT

SKILLS OVERVIEW

Scientific and technical feasibility studies

- Sustainable water saving approach
- Wastewater treatment by on-site or decentralized processes
- Stormwater storage, treatment and infiltration at building and local levels
- Mechanical and hydrodynamic behaviour of water management structures
- Water organoleptic and sensory analysis (PULSE)

Construction and rehabilitation project support

- Prescription and proposal of various solutions
- Analysing the effectiveness of Rehabilitation Programs
- Diagnosis of wastewater facilities
- Numerical and experimental simulations
- Design assistance
- Performance optimization study (Network hygiene, water treatment and quality...)
- Projects and systems sizing

Areas of expertise

OUTSTANDING ACHIEVEMENTS

Eco-cities in China :

- Jilin
- Panshi
- Yuzhong
- Ninghe
- Qingyun
- Jingzhou
- Foshan
- Kaili

Yuzhong, China (design project)

An eco-city on the valley of Nanhe river

This project aims at reforesting and revegetating this territory to supply the groundwater without pollution and ultimately influence the climate through the humidity of the air created by the vegetation.

CSTB's expertise on this project includes:

- **Implementing sustainable water management at the eco-city scale.**
- **Collecting rain water from the hills and the runoff water through 10 semi-covered basins, covered canals for irrigation, agriculture and gardening uses.**
- **Reusing the reclaimed water from the residential buildings (80L/person/day) for irrigation, agriculture and gardening uses.**
- **Using recycled water as an alternative water source to face agricultural water scarcity**
- **Wastewater treatment for villages with natural purification basins and reuse of sewage sludge.**



Jingzhou Garden (completion project)

Combining authenticity and ecology

Invited by the 2nd horticultural exhibition in Hubei province, CSTB has designed a «French-style» garden, the garden was inaugurated in Jingzhou, China on September 28, 2019.

CSTB's expertise on this project includes:

- **Design of 1600m² ecological garden using natural water treatment techniques, specifically lagoon techniques.**
- **Polluted water is pumped from the river to the overlooking garden, fed into three cascading ponds where purifying plants grow, and finally returned, cleaned, to the river.**



Natural disasters



With climate change come more and more natural disasters. When it comes to flooding, fire, mining-induced subsidence, hurricanes, CSTB is providing expertise right after natural disasters to assess the damage.

Afterwards, CSTB can provide assistance during the reconstruction phase in various fields such as resilient urban planning, advice on the upgrade of energy and water systems, waste management and health aspects.



FLOODING



FIRE



HURRICANES



EARTHQUAKE

SKILLS OVERVIEW

A multidisciplinary approach

- Damage assessment, diagnosis of structural risk and recommendations
- Resilient urban planning taking into account flood risk
- Recommendations for climate-resilient energy and water systems
- Climate-resilient waste management
- Health assessment and recommendation (eg. For fungal contaminations after flooding)

Irma Hurricane, St-Martin

Following the Irma hurricane disasters from 2017 in the Caribbean area, CSTB was asked by the French government to provide assistance in the island of Saint Martin.

CSTB expertise included:

- **Diagnosis of damages**
- **Drafting a hurricane-proof regulation**
- **Designing a shelter building model**
- **Training of local teams**



OUTSTANDING ACHIEVEMENTS

- Earthquake diagnosis and reinforcement proposals (Caribbean)
- Technical expertise for the consolidation of Villa Medici (Italy)
- Damage assessment after Irma Hurricane (Saint Martin)
- Recommendation and adaptation of prevention plan in areas facing mining-induced subsidence (France)
- Comprehensive analysis of structures in the Lorraine region, in relation to mining subsidence (iron ore mines). (France)
- Technical assistance for implementation of building code adapted to seismic context (Haiti)

Earthquake in Haiti

Following the earthquake of Port-au-Prince in 2010, CSTB was asked to assist local authorities.

- **Delivering an adapted building code for earthquake-resistant construction**





Integrated urban planning

The French approach is based on integrated and sustainable planning. It combines a careful reading of local planning and architecture with the integration of ecosystems and existing populations. It takes into account local culture and territory assets on several scales.



URBAN DESIGN



SOFT MOBILITY



SOCIAL
INTEGRATION



ECOSYSTEM & NATURAL
WATER MANAGEMENT



LOW CARBON
STRATEGY

SKILLS OVERVIEW

The mission of CSTB is to support local authorities at the design phase of their projects.

The four common standards

- Mobility and the major importance given to public transport
- «Low carbon» energy strategies and the circular economy (waste, sorting, recycling, reuse, short circuits ...).
- Ecosystems, including biodiversity and water management.
- Integration and preservation of neighborhoods, populations and existing local identities

The working method proposed by CSTB is based on 3 key principles:

- The multi-scale spatial approach, closely associating urban solutions with environmental techniques from the design stage
- Co-construction with local actors through on-site workshops
- Respect for identities and local populations and ecosystems

Areas of expertise

OUTSTANDING ACHIEVEMENTS

Eco-cities in China :

- Jilin
- Kaili
- Jingzhou
- Qingyun
- Yuzhong
- Foshan
- Panshi
- Ninghe

Kaili, China

An eco-city between the hills

- Reducing the use of individual transport by developing public transport, especially cable transport connected by bus lines, affordable, ecological and respect the topography of the hills.
- Creating an energy strategy using local resources (heat recovery), geothermal energy and eco-construction while developing sustainable forest management, recover materials from demolition.
- Protecting biodiversity by maintaining the original water level and creating parks of biodiversity along the river, preserving agricultural spaces to retain the humid climate.
- Establishing new residential buildings inspired by the local culture with local materials (wood, stone, river pebbles, terracotta), promote local specialties through restaurants and greenhouse.



Ninghe, China

The eco-city of wetland

- Creating electric bus lines, soft mobility in the eco city and two metro lines connected to Tianjin
- Combining an energy strategy using local renewable resources (solar, geothermal, biogas) with bioclimatic design for positive-energy buildings (double-skin facade)
- Using natural techniques to depollute the Qilihai wetland and developing a hydraulic network of canals bringing clean water, creating a biodiversity parc of wetland accessible for local inhabitants and tourists
- Welcoming the farmers in new grouped houses at the same spot of existing villages



Major Structures

High-rise buildings, stadiums, museums, bridges, tunnels, underground spaces.

All such architectural and civil engineering structures are regularly tested and assessed by our experts.

CSTB accompanies you from the earliest conceptual design phase and impact studies to realization of the project and beyond, monitoring the structure throughout its life cycle, ensuring reliability going forward.



ENGINEERING



ABSOLUTE
SAFETY



CLIMATE
RESILIENCE



SEISMIC LOAD

SKILLS OVERVIEW

A multidisciplinary approach

- Characterization of local weather conditions specifics
- Preliminary wind loading studies
- Studies on structural behaviour (including marine, oil & gas industry)
- Noise pollution control
- Fire safety engineering
- Study on lighting (shadow casting, visual accessibility...)
- Property management simulation
- Carbon footprint optimization
- Thermal and energetic performances

Areas of expertise

OUTSTANDING ACHIEVEMENTS

- New York Times Tower (USA)
- Intesa Sanpaolo (Italy)
- Straj Ural Towers (Russia)
- Interseguro Towers (Peru)
- Bosphorus Bridge (Turkey)
- Odeon Testimonio2 (Monaco)
- Vasco de Gama Bridge (Portugal)
- Jabal Omar Tower (Saudi Arabia)
- Tunnel of Conwy (Wales)
- Port Said Tunnel (Egypt)
- Ismailia Tunnel (Egypt)

Bosphorus Bridge, Turkey

A complete and tailored service encompassing practical, numerical and experimental expertise

A unique structure with exceptional overall dimensions. This bridge holds the record for having the largest suspended area in the world.

- **Conceptual design approach**
- **Deck design optimization**
- **3D modelling of the regional wind climate**
- **Pylon stability and site safety during construction**



The tests were conducted in parallel with work on site, and the results confirmed the assumptions made during inspections of the structure. These studies helped us to confirm, predict and fine-tune this project. Few laboratories offer both the large-scale technical resources and climatic wind tunnel of the CSTB, backed up by an exceptional level of expertise.
Jean-François Klein, CEO and Engineering Partner at T Engineering

Port Said Tunnel, Egypt

Fire test campaign on the tunnel segments under the Suez Canal

Construction of two new tunnels under the Suez Canal completed to link Sinai to the rest of Egypt. The aim is to improve the circulation of people and support the economic and strategic development of the region.

- **Fire safety engineering**
- **Study on structural behaviour**
- **Application of horizontal forces up to more than 1,000 tonnes and vertical forces up to 240 tonnes**

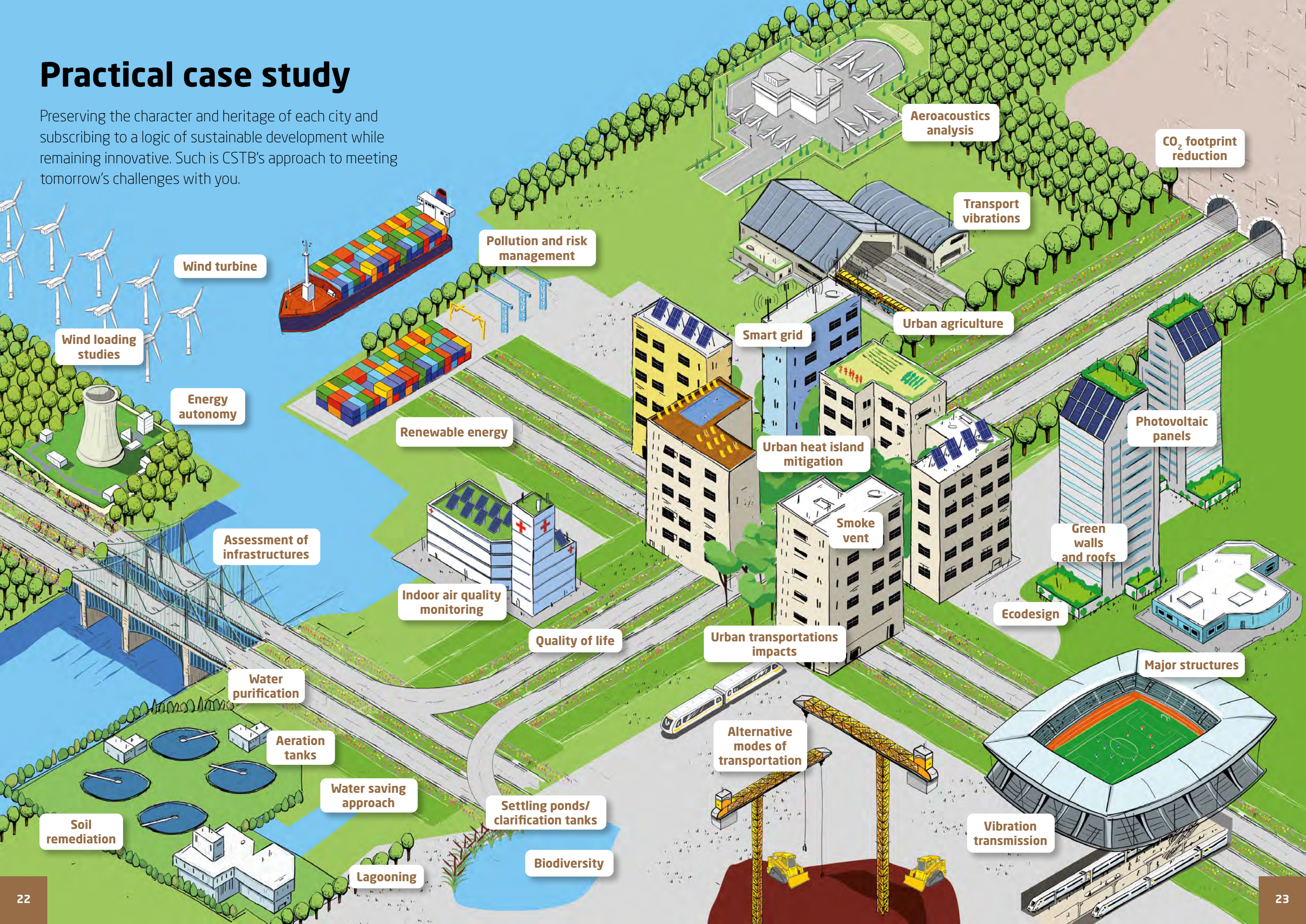


Following the analysis of the test report drawn up, we are now sure that in the event of a fire, the tunnel will be able to withstand thermal loads under the best possible safety conditions.

*Mahmoud Shamma
Engineer, QC Department, Suez Canal Tunnels, Petrojet*

Practical case study

Preserving the character and heritage of each city and subscribing to a logic of sustainable development while remaining innovative. Such is CSTB's approach to meeting tomorrow's challenges with you.



Wind turbine

Wind loading studies

Energy autonomy

Assessment of infrastructures

Water purification

Aeration tanks

Soil remediation

Water saving approach

Lagooning

Renewable energy

Pollution and risk management

Indoor air quality monitoring

Quality of life

Settling ponds/clarification tanks

Biodiversity

Smart grid

Urban heat island mitigation

Smoke vent

Urban transportations impacts

Alternative modes of transportation

Transport vibrations

Urban agriculture

Aeroacoustics analysis

CO₂ footprint reduction

Photovoltaic panels

Green walls and roofs

Ecodesign

Major structures

Vibration transmission

Request for further information



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CSTB's subsidiaries



Controlling noise
pollution: analyze,
recommend,
measure, calculate
and protect



Studies and testing
in aerodynamics



Monitoring
and diagnosis
of indoor air
contaminants



Testing laboratory
and certification
body for solar
photovoltaic
module
performance



The leading French
environmental
certification agency
for non-residential
buildings, sustainable
communities and
stakeholders



International HQE™
certification body
owned jointly by
Certivéa and
Cerqual Qualitel
Certification

Conformity and quality marks delivered by CSTB



QB

QB is a trademark of quality, performance
and reliability of products and systems
used in construction. Also covers the certi-
fication of tools and services



Acermi

Provides neutral, independent support
for insulation product innovation. Tests
and validates specifications and perfor-
mance of thermal insulation products in
production plant and in laboratory.



EU bac

European Building Automation and Controls
Association and represents European
manufacturers for Home and Building
Automation and Energy Service Companies.



NF

CSTB works as a certification body for the
NF mark. The NF mark certifies compliance
of products with applicable national,
European and international normative
documents or with the conditions speci-
fied in normative documents referred to in
certification reference systems.



CE marking

Regulatory CE marking is generally manda-
tory for launching a product on the market.
It indicates a product's compliance with
the basic requirements of the European
regulations and directives, including the
Construction Products Regulation (CPR).

www.cstb.fr/en



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CSTB
le futur en construction