# Libourne aquatic center

by AP-MA Architecture / 2022-07-12 00:00:00 / France / 1369 / FR


**Primary energy need :**

**6004** kWhep/m$^2$.an

**(Calculation method : Other )**

**ENERGY CONSUMPTION**

*Economical building* — *Building*

| | |
|---|---|
| *< 50* | A |
| *51 à 90* | B |
| *91 à 150* | C |
| *151 à 230* | D |
| *231 à 330* | E |
| *331 à 450* | F |
| *> 450* | G |

*Energy-intensive building*

**Building Type** : Swimming pool
**Construction Year** : 2018
**Delivery year** : 2021
**Address 1 - street** : 11 rue de Logrono 33500 LIBOURNE, France
**Climate zone** : [Cfb] Marine Mild Winter, warm summer, no dry season.

**Net Floor Area** : 4 637 m$^2$ SHON
**Construction/refurbishment cost** : 19 000 000 €
**Cost/m2** : 4097.48 €/m$^2$

## General information

## Brief description

Like a large pier, the equipment is intended to be an **architectural signal** among the natural spaces of Lake Dagueys. Visible from the opposite shore, **it nestles deeply into the vegetation** and integrates it into its design. The three pools, the recreational areas and the wellness center also benefit from wide views of the lake through the west and south **facing windows**. The building is elevated to place the bottom of the pools above the highest water level, thus **protecting it from the risks of flooding and rising water tables**.

The architecture of the aquatic center is first of all marked by the great height of the sliding tower, a powerful impetus which must not, however, crush the whole. Thus, to respond to it, two faults are arranged in vertical projection and bring breath, **greenery and light**. The eastern facade, that of the reception, alternates white cubic forms and orangey ochre surfaces embodied by a metallic mesh. Seen from the other side, the western façade reveals the strong presence of the wellness center, white and luminous, between the metallic façades of the pool halls. The silhouette of the entire aquatic center thus becomes perfectly legible: pools, a fitness center, a summer slide area and so many islands of light and greenery facing the lake.

## What makes it an exemplary sustainable building

Saving of filter water and bathing comfort by ceramic membrane

Savings over 30 years :

- **225,000 m³ of water saved** or 750,000 300-liter bathtubs ;
- **610 000 € in water and energy**. Hypothesis: cost = 5€ /m³ of treated and heated water.

Supply of new water from the lake

Savings over 30 years :

- **813,000 m³ of water saved** or 2,710,000 300-liter bathtubs;
- **2.8 M € in water.**

The annual water savings represent the annual consumption of 200 four-person households.

100% biomass heating with absorption heat pump

Carbon savings over 30 years: **15,100 tons of CO2 avoided** or 151,000,000 km in a Clio, which is equivalent to 3,775 times around the Earth.

Thermodynamic air dehumidification

Advantages :

- **40% reduction in energy consumption** compared to a solution without thermodynamic air dehumidification ;
- no electricity consumption ;
- biomass heating and thermodynamic dehumidification equivalent to **3.1 M€ savings in heating and cooling**.

Photovoltaic

The electrical consumption of a swimming pool being considerable, the production of electricity by photovoltaic collectors in **self-consumption** makes it possible to cover **60% of the needs necessary** for the filtration and circulation of water in the indoor pools.

# Sustainable development approach of the project owner

*Interview with Jean-Louis Arcaraz, City of Libourne, 4th deputy in charge of sports, safety and prevention, community advisor in charge of sports, published in the July-August 2021 issue of "Archistorm" magazine.*

**The aquatic center of Libourne, named La Calinésie, has just opened its doors and its pools to the public. Can you go back to its genesis?**

The Libourne area, like so many other French territories far from the coast, was strongly lacking in swimming pools and aquatic centers. This paradox had to be remedied. We then initiated a feasibility study seven years ago. More than 100,000 people were contacted by our services to define with them their needs, their wishes, their desires and their visions of such a facility. Very quickly, the image of a hybrid facility combining sports pools and recreational areas took shape in our minds. We visited 17 facilities in France and Europe, including the aquatic centers of Limoges and Saint-Amand-les-Eaux, designed by AP-MA Architecture. Based on numerous observations and feedback, two of our collaborators and I completed our specifications. It was indeed important for us to work in a small team in order to define and follow our project as well as possible. We immediately imagined a facility with swimming pools and sports pools inside, a friendly area sheltered from the sun for children and exceptional infrastructures (stainless steel pool with curves and counter-curves, dizzying slides) outside, large terraces on which to walk and halls in which to enjoy the entertainment of the place for those who do not swim. We then launched a European architectural competition. 35 agencies responded. We selected ten projects, then five. Surrounded by a jury, we elected AP-MA Architecture as the project manager for our future aquatic center. AP-MA's proposal perfectly projected our program and integrated the future facility into its natural environment, a Natura 2000 zone, while bringing its technical expertise to bear on a low-energy architecture.

**The Libourne aquatic center stands out for its innovative environmental choices.**

We were obsessed with one idea from the start of the project: the use of water from the Dagueys' lake by the aquatic center. What could be more logical than making this link? Obviously, we did not know what a challenge this would be, both technically and administratively. We needed the agreement of the Regional Health Agency, which had never been invited to consider this type of subject. Furthermore, we chose to carry out this project on a self-managed basis and not as a public service delegation. We remain the only ones in charge of the operation of the site, and therefore of the guarantee of sanitary standards. AP-MA, with the support of the Soja engineering firm, designed a very strict technical protocol, based on a water purification unit, then on an ozone and ceramic filtration unit. This technology obviously led to additional costs for the Libournais agglomeration community (Cali), notably because of the digging of tanks in the lake, but this was offset by the water savings: 50,000 m3 per year! The ARS authorizes us to use the water of the lake for the filling of the basins during one year. We hope that after that, we will have the right to use it for other purposes, such as showers, in order to multiply the savings. When you consider that an aquatic center is one of the most energy-intensive architectural programs, there is a lot to be said for it. The energy savings are mainly due to the choice of biomass heating. Our agglomeration community has acquired a forest that will supply 50% of the wood chips over the next three years. The rest will be purchased from a supplier located 30 km from Libourne.

**What about the architecture of the place?**

The site that I have been visiting daily for months now is taking the shape we dreamed of from the beginning. The architects have designed a building that is attractive to look at and pleasant to live in, with its parallelepipedic volumes, its slits of light and its high frameworks. The aquatic center breathes, is welcoming, and offers the visitor magnificent views of the Natura 2000 zone. The flow of bathers, individuals, schools and others, is optimal, and this is obviously a primordial point in the design of a swimming pool. We finalized the interior design by adding a maximum of plants and colors on the walls, in addition to the furniture and signage provided by AP-MA Architecture. This architecture will make possible the ambition of Calinesia: to go beyond its status of aquatic center and become a meeting place. Thanks to the numerous terraces, thanks to the movable floor of the sports pool and to the presence of bleachers, thanks to the restaurant and the snack bar, we will be able to organize numerous events: exhibitions, projections, concerts, literary meetings. We launched the festivities on June 21st, during the Fête de la musique.

# Architectural description

Located on the right bank of the lake of Dagueys, the aquatic center of the community of agglomeration of Libournais is inserted in a **zone with strong environmental stake**. Part lookout, part boom, part vegetated breakwater, the building retranscribes in its own way the atmosphere of a long-distance embarkation by inviting users to take the high ground before jumping into the water.

## Dialogue with the landscape

Like a large pier, the equipment is intended to be an architectural signal among the natural spaces of Lake Dagueys. Visible from the opposite shore, it nestles deeply into the vegetation and integrates it into its design. The three pools, the recreational areas and the wellness center also benefit from wide views of the lake through the west and south facing windows. The building is elevated in order to place the bottom of the pools above the highest water level, thus protecting it from the risks of flooding and rising water tables. The relationship with water is not only visual but also vital: the lake feeds the pool, bringing it the water of the pools and the softness of the air of the halls.

## Horizontality and verticality

The architecture of the aquatic center is first of all marked by the great height of the sliding tower, a powerful impetus that must not, however, crush the whole. Thus, to respond to it, two faults are created in vertical projection and bring breath, greenery and light. The eastern facade, that of the reception, alternates white cubic forms and orange-ochre surfaces embodied by a metallic mesh. Seen from the other side, the western façade reveals the strong presence of the wellness center, white and luminous, between the metallic facades of the pool halls. The silhouette of the entire aquatic center thus becomes perfectly legible: pools, a fitness center, a summer slide area and so many islands of light and greenery facing the lake.

## Light and comfort

The light and the distribution of the spaces are finely studied to offer the visitor the best possible experience. In the southwest corner, in connection with the leisure pool, a large **mineral solarium**, for example, takes advantage of the overhang on the lake. In its continuity, the aquatic play area benefits from the shade provided by the fitness center located on the first floor. In the southeast corner, a large lawn with trees isolates the other users from the noisy activities taking place in this sports and recreational area. The metal mesh bathes the entire site, creating soft light effects throughout the day. Inside, it acts as a sunshade, creating the best lighting conditions for the swimming pools.

## Building users opinion

"The site, which I have been frequenting daily for months now, is taking the form we dreamed of from the start. The architects have designed a building that is attractive to look at and pleasant to live in with its parallelepipedic volumes, its light slits and its high frameworks. The aquatic center breathes, is welcoming, offers the visitor magnificent views of the Natura 2000 area. We have finalized the interior design by adding as many plants and colors as possible to the walls, in addition to the furniture and signage provided by AP-MA Architecture."
Jean-Louis Arcaraz, interview of June 7, 2021 published in the Archistorm magazine dated July-August 2021.

## Photo credit

Geraldine Brunel

# Stakeholders

## Contractor

Name : La Cali
Contact : Jean-Louis Arcaraz
https://www.lacali.fr/

## Construction Manager

Name : AP-MA Architecture
Contact : Jean-François Périnet-Marquet
https://www.ap-ma.fr/

## Stakeholders

Function : Other consultancy agency

Soja Ingénierie

Cédric Jouan

https://www.soja-ing.fr/
BET fluids, SSI

Function : Environmental consultancy

ADOC

05 61 49 57 88

https://adoc-toulouse.com/
Programming

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Function : Construction Manager

Action Archi Arnaud Architectes Associés

05 57 51 15 95

http://www.actionarchi.fr/
Associate project management

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Function : Structures calculist

Sebat

Benjamin Festuot

https://www.sebat-structure.fr/
BET structure

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Function : Other consultancy agency

BEHI

05 62 19 33 19

http://www.behi.fr/presentation-societe/
BET HQE, QEB

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Function : Structures calculist

Agiracoustique

02 35 82 51 37

http://www.agiracoustique.fr/
Acoustic engineering

## Type of market

Global performance contract

# Energy

## Energy consumption

Primary energy need : 6 004,00 kWhep/$m^2$.an

Calculation method : Other

Breakdown for energy consumption : Consumption expressed in kWhep.year. Air heating of the halls Wood 251 160 Gas 62,790 Heating of residual premises Wood 47,212 Gas 11,803 Hot water Wood 183,744 Gas 45,936 Heating of water in indoor pools, excluding draining, including absorption heat pump Wood 425,099 Gas 106,275 Emptying of indoor pools Wood 29,710 Gas 7,427 Heating of wellness equipment (hammam, sauna) Electricity 26,884 Heating of water in outdoor summer pools excluding draining Wood 196,666 Gas 49,166 Summer outdoor pool drains Wood 11,200 Gas 2,800 Heating of water in Nordic pools excluding draining Wood 108,972 Gas 27,243 Nordic basin drains Wood 1,120 Gas 280 Absorption HP Wood 1,085,986 Gas 271,496 Total Wood 2,340,868 Gas 585 216 Electricity 26,884 Electricity for specific use: Inside lighting 138,454 Exterior lighting 30 304 Underwater lighting 4,600 Indoor pool water treatment pumps 446,930 Outdoor pond water treatment pumps 85,957 Heating auxiliaries 457 228 Hall and fitness water games 159,600 Outdoor water games 117,072 AHU fans 576 537 Drinking water 77,620 Various 118,244 ozonator 269,537 Refreshment 8,010 Total 2,490,093 Total (excluding water games) 2,213,421

## Real final energy consumption

Final Energy : 34,76 kWhef/$m^2$.an

Year of the real energy consumption : 2 021

## Envelope performance

More information :
Wall Steel deck roofs
Description (int to ext): 140mm Foamglass cellular glass (λ=0.041)

Uwalls 0.29

Wall Roof terraces
Description (inside to outside): Concrete + 100 mm Polyurethane Effigreen Duo (λ=0.022)
Uwalls 0.22
ITE (external thermal insulation) exterior walls (plaster on insulation)
Description (inside to outside) Concrete + 100 mm Roffmate extruded polystyrene (λ=0.029)
Uwalls 0.27

Walls Walls on exterior ITE (metal cladding)
Description (int to ext): Concrete + 100 mm iso facade mineral wool (λ=0.032)
Uwall 0.30

Wall Interior walls on technical room
Description (int to ext): Concrete + 100mm iso facade mineral wool (λ=0.032)
Uwall 0.30

Wall Low floor on exterior
Description (int to ext): Concrete + 150 mm Fibrastyrene (λ=0.033)
Uwalls 0.22

Basin hall lower floor wall
Description (inside to outside): Concrete 20cm
Uwalls 3.7

Wall Low floor changing rooms on crawl space
Description (int to ext): 8 cm insulated heating floor (λ=0.033)
Uwalls 0.6

Wall Intermediate floor
Description (inside to outside): Concrete 20cm
Uwalls 3.7

Building Compactness Coefficient : 0,54

## More information

Aquatic centers are not subject to thermal regulations given the specific hygrothermal conditions. art 1st paragraph a - order of 13 June 2008 and art. 1st - order of May 3, 2007 amended by the order of March 22, 2017 (entered into force on January 1, 2018) Primary energy consumption for swimming pools is expressed in kWhep/m²pool.year. Equipment delivered less than a year ago, so the consumption report over a representative period has not yet been carried out.

# Renewables & systems

## Systems

Heating system :
- Heat pump
- Others
- Solar thermal

Hot water system :
- Heat pump
- Other hot water system

Cooling system :
- Gas absorption chiller

Ventilation system :
- Double flow heat exchanger

Renewable systems :
- Solar photovoltaic
- Biomass boiler
- Other, specify

Renewable energy production : 48,00 %

## Smart Building

BMS :

The site has an imposing BMS. The BMS offers the following functionalities:

- management and control of technical equipment: heating, ventilation, production of domestic hot water, lighting, water treatment, aquatic activities;

- centralizes metering (water, electricity, heat, number of entries);

- data archiving;

- defect reporting;

- alarm sent to on-call telephone.

## Environment

### Urban environment

Land plot area : 30 000,00 $m^2$

Built-up area : 13,00 %

Green space : 2 000,00

Indeed, the planned location, to the north of the town of Libourne, at the heart of the extension of the Economic Activities Park (EAP) of Dagueys, makes it possible to structure the urban development of this developing service district (pole international nautical, beach, restaurants, hotel, bowling, economic park, fitness center). Its proximity to the A89 motorway interchange guarantees easy access for the surrounding towns, the east of the Gironde and the Dordogne department.

This sector is well served (Calibus urban transport, proximity to the bastide town of Libourne, its services and its TGV and TER train station, direct connection to the A89) and is made dynamic by the presence of several large companies (Ceva, Arena, Schneider Electric), service activities (hotels, restaurants) and recent, high-quality public facilities (lake, promenade, nautical base).

## Products

### Product

SOJA Ingénierie

Cédric Jouan, cedric.jouan[a]soja-ing.fr

https://soja-ing.fr/

Product category : Autres / Autres

## Costs

### Construction and exploitation costs

Total cost of the building : 19 000 000 €

## Health and comfort

### Water management

Consumption from water network : 7 788,00 $m^3$

Consumption of grey water : 2 350,00 $m^3$

Water Self Sufficiency Index : 0.23

Water Consumption/m2 : 1.68

Water Consumption/Shower/day : 2.6

There is no rain collection on the project. However, the site has a lake water purification plant near the site to cover:

- filling the basins and washing the filters;
- washing the floors;
- watering of green spaces.

This is how 27,086 m3 of drinking water are saved per year.

## Indoor Air quality

In an aquatic center, air quality is essential for the comfort of users but also for the proper functioning and sustainability of the complex.

**The air mixing rate is much higher in the hall of the pools** so as to allow better air quality. The pool halls are placed under depression in relation to the adjoining rooms in order to prevent the spread of humidity and the more aggressive air of a pool hall.

**A thermodynamic dehumidification system by a heat pump is present** . This installation makes it possible to maintain a constant relative humidity while recycling the majority of the air.

In addition, the use of efficient water treatment equipment makes it possible to limit the production of tri-chloramine in the air. The efficient filtration systems, the ozone disinfection system and the dechloraminators make it possible to reduce the quantity of chloramine present in the pools.

All of this equipment makes it possible to obtain a trichloramine content in the air of less than 0.2mg/m3.

Finally, the rate of fresh air per person is higher than the regulations in force, it was planned 60 m3/h per person, for 22 m3/h regulation.

## Comfort

Health & comfort :

The quality of water in aquatic centers is a major public health issue. It is for this reason that high **-performance filtration systems** have been put in place. Indeed, **ceramic filters** have a filtration fineness close to 3 microns, when the filtration fineness of conventional filters is between 30 and 40 microns.

Coupled with the filtration system, the water is treated and disinfected by an ozone tower and a gaseous chlorine injection system which aims to destroy chloramines before discharge into the pools and provide the regulatory dose of chlorine.

Particular attention was paid to temperature control in order to avoid the risk of legionellosis and burns on the domestic hot water network. This is produced and stored at more than 60°C, the return temperature of the loop is 50°C minimum.

Damp rooms have tiled or earthenware floors and walls to facilitate maintenance and cleaning operations.

In these spaces, siphons are positioned with slopes allowing the flow of water.

In the pool halls, equipment storage rooms and showers, taps are provided every 15 meters to allow cleaning of the floor.

# Carbon

## GHG emissions

GHG in use : 44,00 $KgCO_2/m^2/an$

Building lifetime : 30,00 année(s)

The GHG estimate was made using the GHG emission ratio by type of production. The ratios are as follows:

Wood: 32 gCO2/kWh
Natural gas: 227 gCO2/kWh
Electricity (nuclear origin): 6 gCO2/kWh

# Contest

## Reasons for participating in the competition(s)

The aquatic center of Libourne is designed by an architectural agency, AP-MA, working hand in hand with a technical and fluid BET (engineering and design department), Soja Ingénierie, allowing significant **savings in water and energy** , so substantial as usual. in the design and construction of public sports facilities. Strongly involved in environmental reflection, the AP-MA Architecture agency works for bioclimatic architecture, with a low ecological footprint and sustainable.

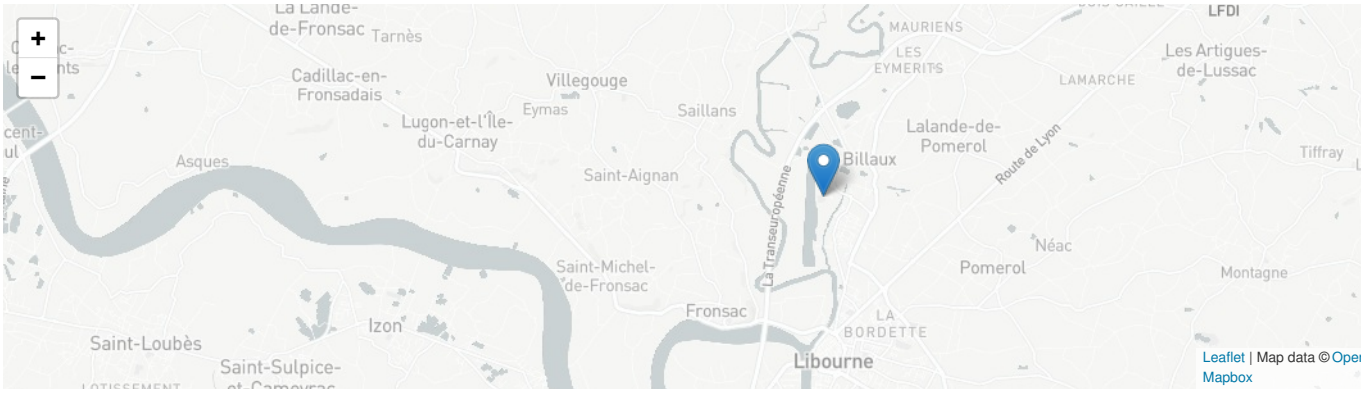
To prolong energy savings, **innovation is a priority**. AP-MA has thus been a pioneer in the use of cutting-edge technologies, such as **water treatment with ozone** and the **production of heat by biomass or geothermal energy on groundwater**.

At the aquatic center of Libourne, a new innovation has been submitted and implemented: the **potabilization of water from Lac des Dagueys** , used to fill and renew the water in the basins, the watering of green spaces and the washing of floors. .

- 100% biomass heating with absorption heat pump ;
- thermodynamic air dehumidification ;
- photovoltaic.

## Building candidate in the category

Prix du public

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