

## Energy efficient buildings

### Eco-innovative crèche in Pipriac, France



<b>Purchasing body:</b>	Redon Agglomération
<b>Contract:</b>	1) Design & project management for construction of a crèche Awarded: October 2016  2) Construction works for crèche Awarded: July 2017
<b>Savings:</b>	<ul style="list-style-type: none"> <li>3.28 tCO<sub>2</sub>/year savings (71%)</li> </ul>

#### SUMMARY

- Construction of a new energy efficient, eco-innovative crèche in Pipriac in accordance with the *eco-crèche charter*
- Flagship project as part of a Brittany region programme to promote eco-construction in rural and peri-urban areas
- Passive building: maximum consumption of 15kWh/m<sup>2</sup>/year for heating, and 63kWh/m<sup>2</sup>/year for primary energy.

## Procurement Approach

In 2012, Redon Agglomération set up an *eco-crèche charter*<sup>1</sup> with 5 priority themes: water, waste, energy, food and social responsibility). This committed the five existing early years childcare centres (crèches) to evaluate the impacts of their daily practices in terms of these themes.

When a 6<sup>th</sup> crèche was to be built in 2015 it was decided to follow this political commitment to construct an eco-friendly building, with the following objectives (taking on board the feedback of the existing 5 crèches):

- Limiting the impact of the construction works and the building itself on the environment
- Achieving maximum user comfort with a healthy and comfortable indoor environment
- Achieving the *passive building* standard for energy efficiency

The crèche will host up to 18 children aged 10 weeks to 4 years old (with children with disabilities or chronic illness staying up to the age of 6).

### Two stage procurement process

The procurement process was split into two stages:

- Selection of architect/project manager - value: €63,400 (July – October 2016)
- Procurement of works contracts - value: €830,000 (12 lots, May – July 2017, with construction expected to be completed in Sept 2018)

In the selection of the architect/project manager their vision for achieving the objectives listed above, their experience in eco-building design, and their willingness to engage with bio-climatisation and eco-building materials were key criteria.

The final technical specifications of the building were then developed by the architect, in collaboration with the contracting authority. Based on the strong environmental ambitions set, and the budget available, the architect proposed a series of technical requirements as listed in the tender specifications below, including construction to the passive building standard.

A comparative assessment of options for heating the building, taking into consideration the thermal performance of the building, environmental impact, technical constraints and overall cost, led to the selection of a propane gas boiler, using Pipriac's propane gas network.

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<sup>1</sup> La Charte de l'éco-crèche: [http://redon-agglomeration.bzh/content/download/2846/32534/version/1/file/CHARTE\\_ECO\\_CRECHE.pdf](http://redon-agglomeration.bzh/content/download/2846/32534/version/1/file/CHARTE_ECO_CRECHE.pdf)

## Social inclusion

Redon Agglomération is committed to a policy of inclusion for marginalised groups through employment. For this reason, in accordance with Articles 30 and 38 of Public Procurement Order No. 2015-899 of 23 July 2015, the specifications for works contracts include implementing clauses to make it easier and promote the employment of people with particular difficulties in integration inclusion and to combat unemployment.

The contract conditions for lots 1 and 2 of the construction works included a requirement to reserve a minimum number of working hours to people meeting these conditions. For lot 1, this was set at 105 hours; for lot 2, at 140 hours

## Tender specifications and Verification - Architect/project manager

### DESCRIPTION OF WORKS

- To design and project manage the construction of a new crèche which meets the passive house standard for energy efficiency, achieves maximum user comfort with a healthy and comfortable indoor environment, and which limits the impact of the construction works and the building itself on the environment

### AWARD CRITERIA

- Price : 40 %
- Technical value : 40 %
  - Understanding of the requirements of the assignment, considering the context of the operation (10%),
  - Suitability of the staff proposed for the assignment (training, professional skills, qualifications and personal experience, according to the needs expressed in the technical and functional program) (20%)
  - Demonstrated experience of the Passive House standard, and willingness to work with bio-climatisation and eco-materials (10%)
- Interview : 20 %

### VERIFICATION

Candidates were required to provide

- a description of the methodology to be applied, in response to the project goals outlined provided in the tender documents

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- an description of their experience with, and understanding of, environmental construction approaches (for example in the choice of materials used, and equipment installed)
  - Curriculum vitae of the proposed team
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## Tender specifications and Verification – Construction works (12 lots)

### TECHNICAL SPECIFICATION

- Compliance with Passive House standard (Maximum consumption of 15kWh/m<sup>2</sup>/year for heating, and 65kWh/m<sup>2</sup>/year for primary energy), including requirements on: bioclimatic design, the use of reinforced natural insulation and triple glazed, dual air flow windows.)
- Solar thermal system for hot water production
- Wooden frame (manufactured in a workshop)
- Insulation with wood wool and cellulose wadding
- Untreated wooden cladding: Douglas fir or chestnut
- Floor made from natural linoleum
- Environmentally friendly paint (meeting the European Ecolabel requirements)
- LED lighting

### AWARD SPECIFICATIONS

- Price : 40 %
- Technical value: 60 %
- Implementation of construction works: – construction site procedures, sequencing of critical tasks, interaction with other lots, quality control, safety, and sustainability (in particular waste management) (20%)
- Quality of materials, equipment and technical solutions proposed (20%)
- Adequacy and organization of human resources (20%)

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#### VERIFICATION

Candidates were required to provide:

- A description of the methodology to be applied in the implementation of the works
  - Technical sheets for
  - The composition of the dedicated team, together with an organizational chart
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## Results

### Environmental impacts

The new building is estimated to save **3.28 tonnes of CO<sub>2</sub>/ year** in relation to current obligatory construction standards – a 50% reduction.

For heating, following current French building codes (RT2012), the 414 m<sup>2</sup> would require 45 kWh/m<sup>2</sup>/yr of heat energy per year. Following the Passive House standard, the Pipriac crèche will only consume 15 kWh/m<sup>2</sup>/yr, of which 12.5 kWh will be provided by natural gas, and 2.5 from solar energy – meaning the crèche will require less than 30% of natural gas it would need if it simply met the obligatory standards. Overall primary energy consumption for the building will be 65 kWh/m<sup>2</sup>/yr – 32% lower than the 93 kWh required by regulation.

In addition, the building will achieve a high level of user comfort. The estimated bioclimatic coefficient for the new building is 45 – more than two times lower than the 110 required by French regulations

**Table 1: Environmental savings**

Tender	Electricity / Natural gas consumption	CO <sub>2</sub> emissions (tonnes/year)	Primary Energy consumption (GWh)
<b>Baseline (current obligatory standards)</b>	10,250 kWh/yr elec. conventional 30,750 kWh/yr elec. green 1,837 Nm <sup>3</sup> /yr natural gas	6.6	0.08
<b>Green tender</b>	10,250 kWh/yr elec. conventional 30,750 kWh/yr elec. green 526 Nm <sup>3</sup> /yr natural gas	3.3	0.007
<b>Savings</b>		<b>3.28 (49.6%)</b>	<b>0.015 (18.3%)</b>

#### CALCULATION BASIS

- As the Passive House standard focuses primarily on the building envelope, influencing heating requirements, and there is no available data relating to electricity consumption in a standard crèche, we have taken a conservative approach, and assumed no difference. There may in reality be savings relating to more efficient ventilation, cooling and lighting.

- PHPP software used by Passive House designers for calculating energy consumption has been applied
- CO<sub>2</sub> emissions factor for electricity: 0.819 kg/kWh
- CO<sub>2</sub> emissions factor for natural gas: 2.503 kg/Nm<sup>3</sup>
- Primary energy factor for electricity: 2.5 for conventional and 1.1 for green
- Primary energy factor for natural gas: 1.1
- Specific heat energy in case of RT2012: 45 kWh/m<sup>2</sup>/yr
- Specific heat energy in case of Passive House: 15 kWh/m<sup>2</sup>/yr (12.5 from natural gas)
- Calculation made using the tool developed within the GPP 2020 project ([www.gpp2020.eu](http://www.gpp2020.eu)), and refined within the SPP Regions project. Available on the SPP Regions website. (More detailed calculation tables are included in the Annex below).

## Market response

For the tender on project management, 25 bids were received. Of the 25, 3 candidates were selected for interviews. These interviews were an opportunity to discuss and decide between the candidates according to their sensitivity and commitment to sustainable development.

For the works contracts (12 lots), 56 bids were received.

## Lessons learned and future challenges

- It is critical that the actual performance of the building when in use meets the theoretical performance during the design phase. Monitoring consumption under real life conditions will be necessary as the impact of user behaviour is very important
- Key to the success of this project was the recruitment of a good project management team, especially in terms of their environmental sensitivity. This is an area it is necessary to improve on to ensure the compatibility between public procurement and the environment

### CONTACT

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## Annex 1 - Calculation of environmental savings

Calculations made using the tool developed within the GPP 2020 project ([www.gpp2020.eu](http://www.gpp2020.eu)), and refined within the SPP Regions project. Available on the SPP Regions website.

Location of energy contracting	France <input type="text"/>		
CO <sub>2</sub> -emissions per kWh electricity (kg/kWh)	0,146	If you know your own rate, enter it on the sheet "General Assumptions".	
Lifetime of the measures implemented in the course of the contract	25	years	
INPUT DATA			
Energy source	Baseline		Green tender
	Current annual energy consumption		Expected annual energy consumption
Electricity, conventional	10 250	kWh	10 250 kWh
Electricity, green	30 750	kWh	30 750 kWh
Heating oil		l	l
Natural Gas	1 837	m <sup>3</sup>	526 m <sup>3</sup>
Wood pellets		kg	kg
Wood		kg	kg
District heating		kWh	kWh
Coal Briquette		kg	kg
Lignite high quality		kg	kg
Lignite low quality		kg	kg
Coke/Anthracite		kg	kg
			TOTAL
SAVINGS			
Expected results	Savings (Baseline / Green tender)		
	Per year	Per lifetime	Percentage
Primary energy savings, (GWh)	0,015	0,366	18,29%
Reduction of CO <sub>2</sub> emissions, (t CO <sub>2</sub> )	3,281	82,036	49,59%



## About SPP Regions

SPP Regions is promoting the creation and expansion of 7 European regional networks of municipalities working together on sustainable public procurement (SPP) and public procurement of innovation (PPI).

The regional networks are collaborating directly on tendering for eco-innovative solutions, whilst building capacities and transferring skills and knowledge through their SPP and PPI activities. The 42 tenders within the project will achieve 54.3 GWh/year primary energy savings and trigger 45 GWh/year renewable energy.

### SPP REGIONS PARTNERS



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