



Rudolf Steiger, Flora Steiger-Crawford (restoration Alfredo Orlando Piña), Bella Laja Sanatorium, Montana, Switzerland, 1927-1930 (restoration 2004-2005), south facade. © Philippe Grandvoinnet, 2004.

## Sanatoriums in Europe: Build Heritage and Transformation Strategies

BY PHILIPPE GRANDVOINNET

Sanatoriums are an emblematic program of the Modern Movement in architecture. Prolifically built in Europe between 1900 and 1950, they constitute today a remarkable architectural heritage whose technical, functional and spatial qualities are well documented. Since the decline of tuberculosis after the WWII, those sanatoriums that were not demolished have been constantly transformed and reused. Although iconic sanatoriums benefited from meticulous restoration, guided by precise historical and technical knowledge, much remains to be done to explore and develop the reuse potential of these buildings.

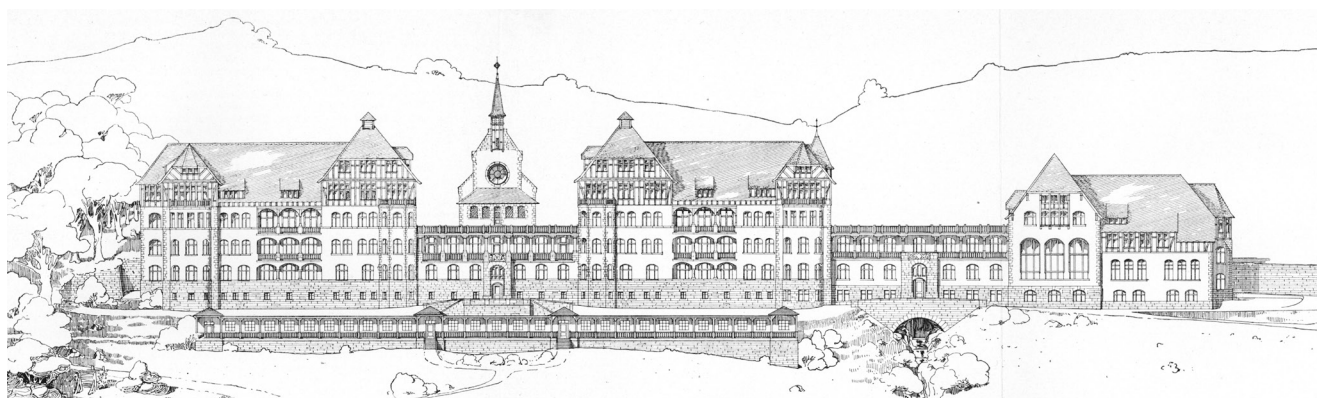
The creation of sanatoriums at the end of the 19<sup>th</sup> century is a direct consequence of scientific progress in the knowledge of tuberculosis. In 1865, Jacques-Antoine Villemin (1827-1892) demonstrated the contagiousness of the disease and laid down the fundamentals of anti-tuberculosis prophylaxis.<sup>1</sup> Physicians remained, however, skeptical because tuberculosis was still poorly understood. The works of biologist Louis Pasteur (1822-1895) and Robert Koch (1843-1910), who succeeded in 1882 in isolating the bacillus responsible for the disease, completed the medical re-evaluation of the old “phthisis”. In France, the Academy of Medicine definitively abandoned the word “phthisis” in 1891 in favor of “tuberculosis”. It became then possible to embark on the path of rational treatment, the principle of which was simple: strengthen the body to enable it to fight against the Koch bacillus. This ambition – none less than Health – went far beyond the only challenge of treating tuberculosis: it concerned the body as a whole and aimed to transform the built environment for the benefit of hygiene and health. At the beginning of the 20<sup>th</sup> century, the basis for tuberculosis treatment in sanatoriums were laid and sanatoriums appeared as an architectural translation of medical knowledge.

The therapeutic process implemented in sanatoriums was precise: subject to a triple cure of air, rest and appropriate food, patients were put in optimal conditions to overcome the tuberculosis infection. This cure constituted, until the 1950s, the fundamentals of the sanatorium therapeutic method. Sanatoriums offered an aseptic environment, which joined hygienist theories developed in the 19<sup>th</sup> century, in which patients may cultivate – so to speak *in vitro* – their health. A new hygiene and health culture arose in sanatoriums at the beginning of the 20<sup>th</sup> century, which explains why the program was so much politically supported. For architects it was an opportunity

to work around formal constraints of academic references and develop a new architecture more in touch with basic human needs. Sanatoriums have been, to this extent, a “laboratory of modernity.”<sup>2</sup>

### Pioneers in health architecture

From 1895 and the creation of the *Deutsche Zentralkomitee zur Errichtung von Heilstätten für Lungenkranke* [German Central Committee for the Construction of Sanatoriums for Tuberculosis] Germany assumed a leading role in the development of sanatoriums in Europe. The first German public sanatorium was opened in 1897 in Oderberg, with financial support of health and invalidity insurance funds. In Europe, the fight against tuberculosis found a golden age at the turn of the century: after a series of national conferences, the first *International Conference on Tuberculosis* was held in 1899 in Berlin. A year after Germany presented more than one hundred and fifty sanatorium plans at the *Paris Universal Exhibition*. Still in 1900, the first international architectural competition for sanatorium design was organized on the occasion of the *Naples Hygiene Exhibition* in Italy: 38 projects were received, divided by the jury into three types of proposals: suburban plan, unique building, mixed formula combining several pavilions brought together by galleries according to the model commonly used in Switzerland and Germany. In Italy, this competition had little impact when the first Italian public sanatorium, Sanatorio Umberto I, was built between 1905 and 1910. The competition organized in 1902 for the construction of the King Edward VII Sanatorium in England had a more significant effect: announced in the international medical press it brought together one hundred and eighty participants from many countries. Two types were predominant: the pavilion type in use in England and in the United States, and the compact or mixed type that spread from Germany



01 Heino Schmieden and Julius Boethke, Beringhausen Sanatorium, North Rhine-Westphalia, Germany, 1901-1904, south facade. © Weltzien, Viktor von, "Lungenheilstätten", in J. Durm, E. Hermann, E. Schmitt, *Handbuch der Architektur. Entwerfen, Anlage und Einrichtung des Gebäude*, Vierter Teil, 5. Halb-Band, 2. Heft: *Verschiedene Heil- und Pflegeanstalten*, Stuttgart, A. Bergsträsser, 1903, 2<sup>nd</sup> edition.

and Switzerland in continental Europe. In 1903, architect Viktor von Weltzien (1836-1927) published in the German *Handbuch der Architektur* a chapter dedicated to sanatoriums (*Lungenheilstätten*) which would become a reference until the 1920s.<sup>3</sup> The largest German sanatoriums were being built at this time and architects started to specialize in this field, such as Heino Schmieden (1835-1913) and Julius Boethke (1864-1917) who built some of the more significant sanatoriums in Germany. There were about forty public sanatoriums in Germany in 1900 and more than one hundred in 1913. Published in 1913 by the physician Johannes Nietner (1828-1874), the guidebook *Deutsche Lungenheilstätten in Wort und Bild*<sup>4</sup> made it possible to measure the extent of the achievements over a short period of fifteen years.

In France, after a few experiments, the first public sanatoriums opened in 1900 near Paris and Lyon. They were built on German patterns, with pavilions forming a U-shaped plan in order to protect the patients from the wind. However, these initiatives remained rare and there were only a dozen public sanatoriums in France in 1914. Like in many other countries, tuberculosis became of national importance during WWI, when civil hospitals had to admit hundreds, then thousands of tubercular soldiers sent back from the front. Temporary hospitals were created in existing buildings consisting mainly of religious estates confiscated from the church after the 1905 French Law on Separation of Church and State. In 1917, the French Government decided to distribute these temporary military hospitals, all over the country, the embryo of a national antituberculosis network, open to civilians. On 7<sup>th</sup> September 1919, the French Sanatorium Law obliged the Departments, as local authorities, to organize and pay for the treatment of tuberculosis patients who had no resources. This law was the beginning of an intense period of sanatorium construction. The director of Bligny Sanatorium from its opening in 1903, Louis Guinard (1864-1939), published, in 1925, a reference guidebook for sanatorium design and management, *La Pratique des sanatoriums*,<sup>5</sup> based on twenty-five years' medical experience in a first generation sanatorium.

At the end of WWI a new era of mass tuberculosis treatment started, which took place in buildings designed as "healing machines", and for which was expected a therapeutic efficiency that was worth the money invested. This is an important paradigmatic shift: originally exclusively of medical interest, sanatoriums became technical and architectural objects, but also symbols of a new architectural culture at the interface of health and construction. This movement was supported by new anti-tuberculosis legislation: in Italy the 1928 Sanatorium Law permitted the construction of more than fifty sanatoriums in a short period of ten years; in Finland the 1930 Sanatorium Law promoted the construction of eight sanatoriums including Paimio (1929-1933, Alvar Aalto architect).<sup>6</sup>

### An architectural type

Sanatorium architecture evolved considerably between the end of the 19<sup>th</sup> and the middle of the 20<sup>th</sup> centuries. Initial architectural patterns, developed in Germany, consisted of either a U-shape hospital-like building or separated pavilions facing South. Open air galleries were at this time scattered in sanatorium parks or placed in the front of the ground floor of the building. This is a type adopted in the first public sanatoriums in Germany, Switzerland and many other countries, like in France (Hauteville Sanatorium, 1900), and which remained in use until WWI. The beginning of the 20<sup>th</sup> century is also characterized by an abundance of architectural experiments, based on sometimes contradictory health recommendations: some practitioners recommended concentrating all the functions and services in a single building, in order to facilitate its functional use and reduce patient displacement. On the contrary, others recommended spreading patients in small pavilions to offer them a maximum of air and light.

At this time, the cottage sanatorium type was very widespread in the United States (Trudeau Sanatorium, 1885) and in England (Papsworth sanatorium village, 1911). It was also used in France in the early 1920s with the financial support of the Rockefeller Foundation. Plougven cottage sanatorium (architect Alfred Louppe) opened in 1923 in Brittany,

and Praz-Coutant village Sanatorium (architects Aristid Daniel and Lucien Bechmann) opened in 1926 in Savoy, are two architectural achievements of this type. In the 1920s more compact buildings became predominant in sanatorium architecture, with a characteristic inverted T-shaped plan, including a long wing of rooms facing South and a transverse wing of services located at the back. This plan would remain typical until the 1950s.

Open air treatment was practiced under a shelter or a gallery which could be either independent of the building itself, connected to it or even integrated with it. These three kinds of fitting led to different architectural types: in the first case, any existing building was suitable for housing patients and it was sufficient to build independent galleries nearby. On the contrary, a new construction became necessary when the galleries were connected or integrated with the building.

The debate on the benefits of mountain climates was never closed: for many practitioners, only the strict curative discipline in a sanatorium was efficient, and if an appropriate climate could improve the expected benefits, it was only a secondary factor. The essential point was to protect the consumptives from rain, wind, excess of sun and air pollution. Consequently, sanatoriums were established in well-oriented sites naturally protected from the wind. On plains, the protection offered by a forest could be sufficient, as in the mountains a sheltered southern slope sufficed. Because the French Sanatorium Law required each Department to ensure the treatment of its consumptives, sanatoriums were being built in all regions, with the exception of the seaside that was contraindicated in the treatment of pulmonary tuberculosis.

On the plain, a location which presented little constraints, sanatoriums could be elongated to offer each room the air and light conditions requested by the treatment. These buildings had a horizontal organization, with up to three floors. This type was very common in the early 1930s, with sometimes extreme developments. Many large public sanatoriums belonged to this type, among them the five hundred meters long Petit-Arbois Sanatorium (Gaston Castel architect, 1936) in Provence. In the mountains, the construction of a sanatorium needed to take into account specific constraints like climate (extreme temperature variations, snow), ground instability and difficult access conditions. The architect's answer to these constraints was to construct compact buildings that rose vertically. For Martel de Janville Sanatorium (Savoy), the architects Pol Abraham (1891-1966) and Henry Jacques Le Môme (1897-1997) designed in 1932 an asymmetrical building consisting of an elongated wing of five floors and a "tower of rooms" of 10 floors.<sup>7</sup> This high-rise sanatorium type, made possible by the use of a reinforced concrete frame, can be considered as specifically alpine. It offered several advantages: reduction of earthworks and foundation costs, and an increase in the thermal inertia that facilitated heating.<sup>8</sup> This compactness, prevalent in high-altitude sanatoriums, necessitated grouping all functions within a single building and thus articulating various program elements together.

It sometimes led to a technical *tour de force*, made possible by the use of reinforced concrete: in Martel de Janville the south facade of the tallest wing is carried by the concrete arches of the dining room.

Another type of sanatorium derived from German patterns is the terrace type. This type was theorized in 1902 by German physician David Sarason who obtained an international patent for "a new type of construction for hospitals and sanatoriums", so called *Terrassen-System*. In France, the Franco-American Sanatorium project designed by Tony Garnier (1869-1948) in 1917 to accommodate five thousand tuberculosis patients, used a large scale terrace type. Richard Döcker (1894-1968) published in 1929 his book *Das Terrassentyp*<sup>9</sup> which had a strong influence in Europe. In France, the terrace type was very successful at the end of the 1920s in ambitious projects such as Versailles Sanatorium (Bailly and Saacke architects, 1931, unrealized), Aincourt Sanatorium (Edouard Crevel & Paul Decaux architects, near Paris, 1933), Bodiffé-en-Plémet Sanatorium (Britany, Louis Feine and Paul Tournon architects, 1933), Bodélio Hospital (Brittany, Maurice Puteau architect, 1935) or Guébriant Sanatorium (Savoy, Abraham and Le Môme architects, 1933).

Guébriant Sanatorium is the most renowned of them. The building consisted of a succession of terraces, with six floors. The bactericidal action exercised daily by the sunlight on the floors and walls was explained in the review *L'Architecte* with a series of photos showing a ray of light "disinfecting the room by traversing it during the day."<sup>10</sup> Terraces were actually considered as an instrument of health, because they made possible to "achieve, without effort and without difficulty, automatically (...) the permanent asepsis of all parts of the sanatorium."<sup>11</sup> If terraces could really improve the treatment, their building cost had been a strong impediment to a further development in sanatorium construction.

### Architectural heritage

Sixty years of public antituberculosis health policy had left Europe an important built heritage. Nowadays we can appreciate the architectural qualities of these buildings, but also their fragility. In France, about three hundred and fifty sanatoriums were built. We can still perfectly identify these buildings because of their typological characteristics: south orientation, thin shape facilitating the penetration of air and light, open air galleries. These characteristics are the most visible hallmarks of sanatorium architecture and distinguish them from all other types of health construction. The strong identity of these buildings comes from the efficiency of their architectural and technical features. The facade, the plan and the interior fittings of a sanatorium together formed the elements of a complex hygienic mechanism, whose first objective was to improve the therapeutic efficiency of open-air treatment by offering appropriate healing conditions. Sanatoriums were not designed as hospitals and it was a deliberate choice: since patients could stay there for months or years, buildings were designed in order to make life more comfortable, avoiding any hospital reference. Physicians and architects were concerned for patients'



**02** Joseph Bardin and Marcel Favier, La Musse Sanatorium, Arnières, Normandy, France, opened in 1933, south facade of a pavilion. © Post card, private collection.



**03** Jan Duiker, Bernard Bijvoet and Jan Gerko Wiebenga (restoration Hubert-Jan Henket and Wessel de Jonge), Zonnestraal Sanatorium, Hilversum, Netherlands, 1926-1928 (restoration 2000-2003), central pavilion under restoration in 2003. © Philippe Grandvoinnet.

well-being, for whom a special effort was made to create a pleasant living environment.

Open-air treatment was abandoned after WWII and sanatoriums started to decline.<sup>12</sup> The buildings had then to be adapted to new technical standards, and many of them lost then the “architectural sincerity”<sup>13</sup> which was the basis of their design. In France, sanatorium conversion started in the late 1960s when antibiotic therapies emptied the buildings of their patients. Initially, these conversions had a limited impact on the buildings, which were simply dedicated to the cure of other kinds of patients. Their architectural transformation really started in the 1990s due to the aging of the buildings and equipment, and the evolution of medical techniques. But without a systematic inventory, public administration or architects could not identify what had to be preserved as a heritage.<sup>14</sup>

The creation in 1999 of the label “Heritage of the 20<sup>th</sup> century” by the Ministry of Culture (France), which became labeled in 2016 as “Remarkable Contemporary Architecture”, made it possible to change the way in which sanatoriums were perceived. About twenty of them have been labeled since then, which has helped the recognition of their architectural qualities. Therefore, transformation strategies could be developed taking into account the architectural type, the structure and characteristics of the buildings.

### Icons restoration

At the turn of the millenium, the restoration of sanatoriums which were Modernist icons started, related to legal protection measures. Sanatorium Zonnestraal (Jan Duiker and Bernard Bijvoet architects, Jan Gerko Wiebenga engineer, 1925-1931), in Hilversum (Netherlands), is an emblematic achievement of the architectural avant-garde of the 1920s. Listed in 1995 on the provisional list of nominations for United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage for the Netherlands, the building was carefully restored by Hubert-Jan Henket (1940-) and Wessel de Jonge (1957-) who developed for the project a unique technical, historical and critical apparatus. If such a restoration would

have probably not been possible in another context and could hardly be applied to other sanatoriums, mainly for economic reasons, it still offers an exemplary and well-documented<sup>15</sup> methodological framework which can inspire any transformation or restoration project. Sadly, the Dutch Minister of Culture has decided in 2019 to withdraw sanatorium Zonnestraal from nomination on unclear grounds. Many, among **docomomo** have protested against this unjustifiable decision, up to now without success.

Paimio is another emblematic sanatorium, a masterwork of the Finnish architect Alvar Aalto (1898-1976). Opened in 1933, it was turned into a hospital in the 1960s and protected in 1993. With the technical support of the Alvar Aalto Foundation, a repair and maintenance program was inaugurated in order to preserve the architectural characteristics of the buildings (nature of materials, colors, furniture), while ensuring the proper functioning of the medical activities.<sup>16</sup> The preservation of elements of architectural or technical interest was integrated into the intervention program that was implemented in stages. It concerned, in particular, the improvement of comfort conditions and the upgrading of equipment, according to the needs of the hospital. This program guaranteed the overall coherence of the conservation project and the long-term vision of what would otherwise be only a succession of isolated interventions. Like Zonnestraal in 1995, Paimio was listed in 2004 on the provisional list of nominations for UNESCO World Heritage for Finland and the repair and maintenance program was upgraded in 2016 into a Conservation Management Plan by the Alvar Aalto Foundation in order to guide the future use, care and conservation of the building. The building's owner, the Hospital District of Southwest Finland, announced in 2018 its intention of selling it, and an inquiry into the future of Paimio was launched by the Finnish government “to draw up a proposal for an economically viable model for covering the site's maintenance and operating costs.”<sup>17</sup>

Bella Lui Sanatorium was built in Montana, Switzerland, in the late 1920s by Rudolf Steiger (1900-1982) and Flora Steiger-Crawford (1899-1991), with an innovative metal structure whose elements were assembled by soldering.



**04** Alfonse Arati and Marcel Boyer, Rhône-Azur Sanatorium, Briançon, France, 1951-1957, south facade. © UGECAM PACA.



**05** Pol Abraham and Henry Jacques Le Même, Martel de Janville Sanatorium, Le Plateau d'Assy Savoy, France, 1932-1937 (restoration 2005-2008), south facade after the restoration works in 2010. © CAUE 74, Romain Blanchi.



**06** Albéric Aubert (restoration Pierre du Besset and Dominique Lion), Sabourin Sanatorium, Clermont-Ferrand, France, 1931-1934 (restoration 2010-2015), south facade. © Philippe Grandvoinet, 2016.

Due to the development of a ski resort, the sanatorium was transformed in the 1930s into a hotel, but most of its original facilities had been preserved until the completion of transformation works in 1992. The aim of these works was to bring the building up to hotel standards, notably by creating bathrooms in the bedrooms and installing soundproof partitions. The original furniture disappeared then and the steel window frames of the dining room were replaced by plastic frames. The replacement of the original frames should have been continued in 2001, when a global consideration of the preservation of the building started after the recognition of its architectural qualities by the cantonal administration of Valais. Under supervision of the architect in charge of the project, Alfredo Orlando Piña, and local authorities, a protocol for the restoration of the south facade of the sanatorium was defined, based on a careful diagnosis of the existing materials and elements. The objective was to keep as much original material as possible: the damaged concrete surfaces were cleared by micro-demolition to a thickness of 3 to 4 centimeters, sufficient to install formwork and reinstate the surface; the carbonated concrete received a re-alkalinizing chemical treatment to protect the steel from corrosion. The slope of the balconies was corrected to facilitate drainage of the water and thus eliminate recurrent infiltration of the rooms. A chromatic study concluded that the facade was initially covered with a yellow ocher mineral paint, which was reinstated at the end of the work in 2004. This intervention is the result of a project based on a careful selection of the elements to be preserved and those that can be repaired or replaced. Even if this restoration was limited to the south facade of the building, the added value was broader: not only was the exceptional quality of the building recognized on this occasion, but it also enabled the owner-manager to re-evaluate its commercial positioning: Historic Bella Lui 1930 Hotel is now part of the Swiss Historic Hotels network as a “living witness to modern architecture.”

### Pragmatic rehabilitations

In these study cases legal protection was helpful in the restoration process. In France, three sanatoriums have been listed as monuments; including the Martel de Janville Sanatorium in Savoy, the Sabourin Hospital and Sanatorium in Clermont-Ferrand. Built by Pol Abraham and Henry Jacques Le Même, Martel de Janville<sup>18</sup> was finally closed in 2006. It was immediately listed as a monument. Located between Geneva and Chamonix, facing Mont-Blanc, the building was acquired by an investor with a project for a residential building of one hundred and twenty apartments. Thanks to the legal protection the investor could write off part of the restoration costs. Nevertheless, the reuse project had to face economic constraints and heritage requirements. The restoration of the south facade in its original state in a “light terracotta red” color was consensual, but the north facade was transformed and enlarged because the building was considered too thin for residential use. The original window frames, designed by Jean Prouvé (1901-1984), were also replaced. The reuse of common services in

the building was another challenge: the chapel at the top of the building was restored to its original state, but the monumental dining room on the ground floor was converted into duplex apartments. Although the volume and appearance of the building have been largely preserved, this project raises the question of the adequacy of a transformation program within existing spaces.

The transformation of Sabourin Hospital and Sanatorium in Clermont-Ferrand, built in 1934 by Albéric Aubert (1895-1971), is a very different case. The use of a reinforced concrete frame allowed the superposition of levels totally different in their architectural organization (with dormitories and rooms, different kinds of open-air galleries). This unique achievement was a *pot pourri* of what was seen at that time as the best architectural features in sanatorium architecture.<sup>19</sup> It was transformed into a hospital in the 1960s and started a steady decline in its activity, until its closure in 1997. Its demolition was then considered, but the building was listed as a monument in 2000 and bought in 2002 by the Ministry of Culture, which planned to transfer it to the school of architecture located in the city center. An architectural competition for its transformation was launched in 2007, with a program of 7000 m<sup>2</sup> and a budget of about thirty million euros. The winners of the competition were the architects Pierre du Besset (1949-) and Dominique Lion (1954-). The restoration of the south facade in its original layout was required, but other parts of the building could be adapted to the needs of the program. Transformation of a health institution into a higher education building is a challenge, because these two programs have nothing in common in terms of space and use. The difficulties were also increased by complex technical constraints, in particular those related to accessibility and earthquake protection. Because of the shape of the building – long and thin – its earthquake resistance could not be guaranteed and it led to a radical solution: the internal structure of the building was completely demolished and rebuild with a three-dimensional earthquake-proof framework made of concrete and steel. Emptied of its original structure the building lost almost all of its original interior fittings. The internal distribution was also modified: the circulation was moved to the South and constituted an intermediate space which preserved the teaching rooms from sun and heat.

These projects, despite the difficulties, allowed the preservation of the buildings. Many other sanatoriums were abandoned or demolished, like the three sanatoriums of Saint-Hilaire-du-Touvet, near Grenoble, where medical activity definitely stopped in 2009 (demolished in 2018). Briançon, set up on the Italian border, presents in this respect an interesting situation. It is a dynamic ski resort, and has a remarkable architectural heritage: the Vauban fortress built in the 17<sup>th</sup> century was listed on the UNESCO World Heritage list in 2008. Since the 1920s, Briançon has also been an important open air treatment center and is still recognized today as a Health City by the World Health Organization. The first sanatorium in Briançon was built in 1928 by the Army on the terrace of a 19<sup>th</sup> century fort located inside

the UNESCO perimeter.<sup>20</sup> It was labeled “Heritage of the 20<sup>th</sup> century” in 2013 and transformed into a housing estate by a group of inhabitants. There are about ten other sanatoriums in Briançon, most of them located in the former climate zone dedicated in the 1940s to the treatment of tuberculosis, like Rhône-Azur one of the last sanatoriums built in France. It recently led the municipality to develop a strategy for promoting climate heritage and raise awareness among residents and tourists about the architectural quality of 20<sup>th</sup> century buildings. This is an interesting example of a cultural strategy based on recent heritage promotion.

Completed almost twenty years ago the restoration of modern icons like Zonnestraal or Paimio are still relevant today.<sup>21</sup> Others restoration or reuse projects of sanatoriums have been completed since then, but many other buildings have been recently abandoned or demolished. The transformation process of former sanatoriums continues, with the recent critical support of research projects which have considerably increased historical, architectural and technical knowledge about sanatoriums. The future of these buildings remains, nevertheless, uncertain. Their construction and architectural qualities are now well known, but they now enter, as economic resources, into competition with other typologies of buildings which, in their turn, are experiencing a period of decline and abandonment. In the Alps for instance, climate change is weakening the business model of mid-altitude ski resorts, making transformation projects of hotels and former sanatoriums more and more uncertain from an economic point of view. The choice to restore, transform or demolish is always the result of a technical, economic and political decision. Such a decision must be enlightened by scientific knowledge of architectural history and techniques. In this respect, education and documentation are still major challenges.

#### Notes

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