



ANNUAL REPORT 2019



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Give Me Five: five priorities



Today the construction industry is in the spotlight more than ever before. Every day we are faced with the challenges of CO₂ emissions, waste production, accessibility of dwellings, housing density, shrinking profits due to foreign competition, etc. Through collective research and innovation, but also thanks to the technological and organisational progress associated with the fourth industrial revolution, we can play our part in formulating answers to these major societal challenges and thus boost the image of the sector. These are just some of the essential tasks that construction companies have entrusted to the BBRI.

Almost a year ago, we launched an action plan with a single goal: to be your partner for innovation and change. This plan called 'Give Me Five' contains five priorities, all devoted entirely to providing the high added value that our activities should be able to offer to your company.

The first priority focuses of course on our core activity: **applied research and innovation**, which our highly skilled, passionate and eager-to-learn colleagues conduct in close collaboration with the construction industry.

The second priority is equally fundamental and deserves our daily attention: **offering services with increased added value to our members**. Even if this requirement is, so to speak, in our genes, we now need to redouble our efforts to better understand the often specific expectations of our customers.

Since communication is central to our society, **we need to communicate and to train more and better**. This is therefore the third priority of the 'Give Me Five' action plan.

Olivier Vandooren
Director General

Give w

for a rapidly evolving sector

The fourth priority is based on the fourth industrial revolution. We too must take advantage of the opportunities offered by new technologies to provide companies with improved support and guidance. Therefore it is our intention to achieve [a BBRI 4.0 for a construction sector 4.0](#).

With the fifth and final priority, we want to [stimulate sectoral cooperation and partnerships even more](#), so that our members, the sector and also society and all citizens in general can enjoy them in the first place.

These five priorities are abundantly illustrated on the following pages and form the leitmotiv in this report on our activities in 2019. These activities are, as always, organised by theme and highlight a number of projects or works that relate to the challenges currently facing the sector: energy renovation, high-performance and high-comfort technical installations, construction 4.0 and modern building materials and systems. By highlighting the crucial role of all BBRI employees in the success of the different projects, there is also room in this report for the human aspect. We also highlight the success of the partnerships that have existed for many years and which we would like to showcase even more.

Finally, the unprecedented crisis caused by the coronavirus has shown us that we live in an unstable world where everything is interdependent and changes can happen very quickly and at times abruptly. All companies, including the BBRI, must demonstrate a solid dose of resilience and creativity in order to adapt to this increasing complexity. So let's roll up our sleeves and join hands together. Alone we may move faster, but together we go further!



Johan Willemen
Chairman





The BBRI management team, from left to right: Bart Ingelaere (Deputy Director General and Director Information and Management Techniques), Fabrice de Barquin (Deputy Director Research and Development and Scientific Adviser), Bart Michiels (Head of Finance), Olivier Vandooren (Director General), Jörg Wijnants (Director Information and Companies Support), Johan Vyncke (General Adviser), Georges Klepfisch (General Representative Standardisation and Certification), Jan Desmyter (Director Research and Development), Wim Van de Sande (Secretary General).

Not pictured: Peter Wouters (Director Standardisation and Certification).



Innovating with excellence, vision and openness is not only a challenge, but also an opportunity to meet the changing needs of our society.

Jan Desmyter
Director Research and
Development

Fabrice de Barquin
Deputy Director
Research and
Development and
Scientific Adviser



Innovation has always been a key pillar of the BBRI's mission. It is no surprise that the first of our five general priorities in the 'Give Me Five' action plan is innovation with vision, openness and excellence. In the past year, we have already taken a lot of action on this theme. This includes creating a new framework that allows us to prioritise our actions based on their real impact on the industry in general and on contractors in particular.

These three aspects – vision, openness and excellence – are reflected in different ways in the BBRI's operations and projects. In 2019, they were integrated into the functioning of the various clusters and competitiveness poles in which we are actively involved, and in which the first and essential requirement is invariably to align the objectives of these with the real needs of construction companies.

Convinced that individual interests are also collective interests, the clusters and competitiveness poles strive for open cooperation between all parties involved. The collaboration with universities, colleges, knowledge centres, federations and companies is focused fully on our most important added value: integrating innovations into construction and renovation processes.

Good examples are the event that we organised, together with the clusters BIM, Building Industrialisation and Smart Buildings in Use, at our new site in Sint-Stevens-Woluwe, as well as the event we hosted in Limelette with the Greenwin competitiveness pool. In both cases the practical applicability of the innovations was demonstrated. Initiatives such as the technology hub around drone-based photogrammetry that was launched in Greenbizz, also contribute to showcasing the concrete value and the proper application of innovations.

As you read this annual report, it will quickly become clear that at BBRI we are working on many large-scale longer-term research projects. At the same time, we are conducting a number of smaller, exploratory studies and developing a number of very practical and progressive innovations that can be immediately applied on site.

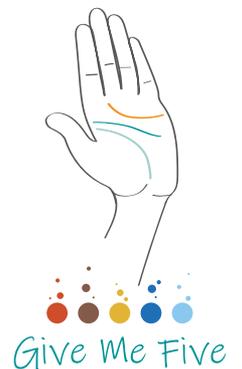
The aim of these projects, which last up to one year and are fully financed with the contributions of the companies, is to formulate answers to questions requiring short-term solutions. In 2019, they covered various topics: cleaning plaster façades (ETICS), developing specific calculation modules for windows and glazing, attenuating electromagnetic 5G waves in buildings and the subsidence observed in blown-in cellulose insulation. With this latest project we are investigating how to guarantee the performance of cellulose-based insulation. In some cases, the blown-in fibres can subside, potentially causing thermal bridges. The other three projects mentioned above, which are discussed elsewhere in this annual report, all aim to add value to our activities and to quickly meet the needs of contractors.

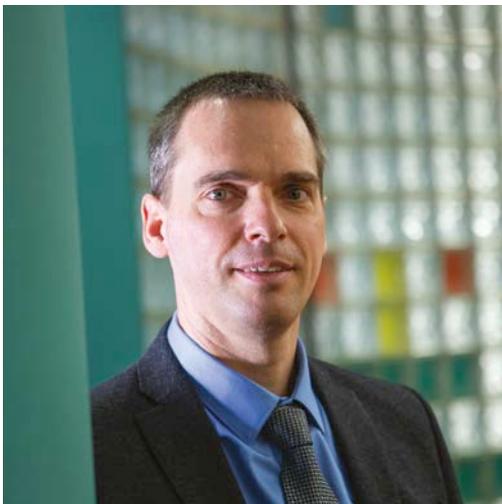
We have also decided to support inspiring PhD studies which focus on our chosen domains. In this way we hope to explore new domains and visionary concepts more thoroughly. Of course, it is also important that such studies are aimed at gathering knowledge that is useful to contractors.



We conduct certain research activities in our own name in order to quickly meet the contractors' needs.

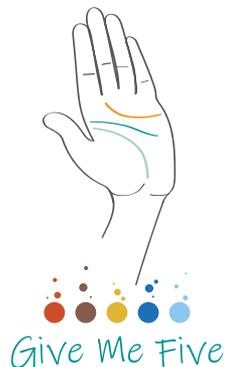
Johan Vyncke
General Adviser





More and better communication is an absolute priority.

Jörg Wijnants
Directeur Information
and Companies Support



One of the main tasks of the Institute is to inform the sector in general and construction companies in particular. The speed at which the world is changing makes it extremely important to provide continuous training to construction professionals. The need to increase and improve communication and training is therefore an absolute priority for everyone.

The key to being closer to our members lies in the application of modern and innovative media, but above all in using a language that is adapted to our audience. In 2019, we were striving for a better balance in the advices and reports of the engineers of our 'Technical Advice' division so as to put across messages which are both nuanced and complete as well as scientific and easy to understand. For this reason, our site reports are now introduced by a summary of no more than half a page with all essential information. The rest of the report is, of course, as always complete and nuanced.

Other important changes concern the *CSTC-Contact*, the magazine with a circulation of over 110,000 copies, containing articles that are compiled in collaboration with the Technical Committees. Since 2019, this magazine is published every two months, which means that our contact with the contractors is more frequent, but also allows us to react more quickly in an emergency. The second change concerns the layout, which is now more airy and richly illustrated. Finally, we are paying special attention to the use of language. Although the articles must always be technically correct, they must also be easily understandable for the majority of our readers.

This is just the top of the iceberg. Together with our partners we are continuing to work on a lot of other new developments. A new website, the use of social media and remote training courses are just a few examples of current projects. They all have a single goal: to provide short-term responses to the current and future needs of our members.

In the past year, we have again taken major steps towards construction 4.0. Belgium can now measure itself with the Northern European countries, which only a few years ago were still well ahead in the application of digital technologies in construction. And this applies not just to the larger companies in the construction sector. The BBRI is striving to introduce as many SMEs as possible to the advantages of the technology and of BIM.

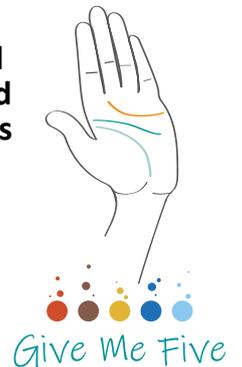
In 2019, we started developing the BIMio web service. Via BIMio we want to make all information and knowledge gathered by the BBRI available to smaller construction companies. We are also working on the development of a simple viewer which allows construction professionals to easily visualise a BIM model and request quantities from it. This tool will also allow users to consult the cost calculation tool 'cpro' that the BBRI has developed, along with a commercial BIM modelling package. We are aiming to make a first version of the BIMio web service available to all our members by mid-2020. In this way the BBRI is transforming itself in order to give all companies, large or small, the opportunity to benefit from technological progress.

BIMio is the BBRI's most ambitious construction 4.0 project, but of course it does not stop there. We have also expanded our range of training courses on digital applications. At the Digital Construction Brussels fair, construction professionals were able to attend a whole range of lectures and visit various exhibitors. And of course, we must not forget the different working groups that continued their activities in 2019.



Making Construction 4.0 also accessible to smaller companies.

Bart Ingelaere
Deputy Director General
Director Information and
Management Techniques





Standards, approvals, certification and STS: towards added value for the construction sector.



Give Me Five

Peter Wouters
Director Standardisation
and Certification

Georges Klepfisch
General Representative
Standardisation and
Certification

When carrying out construction work and using construction products it is always wise to stick to certain rules. These can be found in the Technical Specifications (STS), NBN standards and Technical Approvals (ATG). These documents are complementary to our Technical Information Notes (TINs), which contain good practice guidelines.

Certification serves to demonstrate that a product, company or process complies with the rules and good practices. This means greater added value for the customer, but also for the contractor, who sets himself apart from the competition in this way. The technical approvals issued by the Belgian approval institute UBAtc describe innovative, unique products and complex systems for which no standards exist and/or which are not covered by the traditional rules. In 2019, the UBAtc processed some 280 applications, resulting in more than 300 approval texts. Its work also marked the start of an industry-supported activity concerning foundation piles. Thanks to this approach, innovations can be validated and then implemented on-site.

No other sector is so dependent on standardisation. That is why the BBRI also played a prominent role in 2019 as a sectoral operator in the organisation of standardisation. For this we carried out prenormative studies on behalf of the NBN and the Federal Public Service (FPS) Economy, we developed standards in the approximately 50 standardisation committees and we informed construction sector players about evolutions in standardisation. This was done through the 13 Standards Antennae, which we have established with the support of the FPS Economy. This important assignment allows us to clarify the sometimes abstract content of normative documents for the sector.

Finally, in 2019 the idea was introduced in the BBRI's Technical Committees that it is useful to draft a STS with a description of the construction works during the elaboration of new TIN. In this way, the two documents fit together seamlessly.

The 15 Technical Committees (TCs) play a crucial role in the BBRI's operations. They define the needs of the construction sector with regard to applied research and they ensure that these requirements are at the centre of our activities. The TCs consist mainly of construction companies and form the basis of the bottom-up approach that makes the BBRI so unique.

It goes without saying that the Technical Committees are directly involved in the Institute's 'Give Me Five' transformation plan, which the General Management has presented to all Committees from September onwards. Brainstorming sessions have been held to find ways to improve communication towards the industry and to increase the added value of our activities for our member contractors.

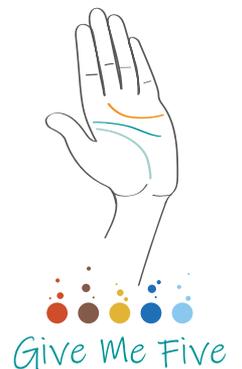
These thinking exercises, in which more than 250 TC members participated, provided a raft of suggestions. The first concrete activities will be ready to go in 2020:

- developing awareness-raising initiatives to improve the visibility of the BBRI's services to contractors
- assembling animations and videos (in addition to the publications) for a more visual communication with the sector
- providing more targeted technical advice which is as always as complete as possible
- developing practical tools for contractors
- collaborating with materials distributors to reach as many professionals as possible
- ...

For the Technical Committees, the new action plan is clearly the necessary lever to stimulate collaborations and partnerships with contractors.



The Technical Committees as levers to stimulate partnerships and collaboration.



Comfort, health and safety



Providing detailed information on fire prevention to the construction industry is a must

Each year, the first issue of the BBRI's bimonthly magazine the *CSTC-Contact* is a thematic one. In 2019, this issue was entirely devoted to fire safety. The many questions received by the 'Technical Advice' division's engineers told us that fire prevention regulations were not always being correctly interpreted. In addition, the regulations are due to be adjusted in the course of 2020.

In the *CSTC-Contact 2019/1*, fire prevention is discussed over more than 30 pages, starting with the basic principles, an area in which a certain degree of confusion remains. The magazine then focused on the specific problems relating to façades, car parks, doors, etc. We also look ahead to legislative items that will soon be changing, so that contractors and designers can already anticipate this. In this way, the *CSTC-Contact* has something useful for everyone.

Fire prevention is an important theme with a major human, social and economic impact. The environmental consequences too are far from negligible. For this reason, we were keen to share our knowledge with the construction sector in the best possible way. The BBRI will continue actively to monitor developments in this area and several new publications on this subject are already planned.



The thematic issue of the *CSTC-Contact* enabled us to **communicate better** on fire prevention.



Fire safety, an up-and-coming theme

The BBRI's 'Technical Advice' division is daily confronted with questions from the entire sector. For several years, we have observed a general increase in the number of questions involving fire safety (about 10 % of all questions annually).

To help the sector efficiently and to mitigate this increase, the thematic edition of the *CSTC-Contact* of 2019 was entirely devoted

to the fire safety of buildings. Our efforts to provide information paid off: the number of questions did not increase in 2019.

However, the problems that are reaching us are becoming increasingly complex, often requiring an interpretation of the various legislative and normative documents. These include, for example, the requirements imposed on the fire reaction

of façade cladding or the problem of fire spread via façades. These topics will be addressed in 2020 when the regulations are amended, including the risk of fire spread through flammable insulation materials and ventilated air cavities. These new and more stringent regulations are essential to prevent a dramatic fire like the one in London's Grenfell Tower.



Source: Shutterstock



Supporting contractors **on a daily basis** is a top priority.



Gaining a better understanding of wireless communication in order to promote **smart buildings**.

Wireless communication inside buildings

Wireless communication can take many forms: 4G, wifi, bluetooth, etc. We use this technology all the time to make calls, surf, watch videos and listen to music. However, not all building materials are equally permeable to wireless communication. Metal, for example, is impenetrable for electromagnetic waves. The use of certain elements in façades or roofs, such as insulating plates covered with metal layers, can therefore lead to connectivity issues, making 4G unavailable in some buildings.

We want to fully understand this subject in order to help construction players to take this issue into account as from the design phase up to and including the commissioning of the building. In 2019, we addressed this new issue via an internally funded project.

In the past year, an exchange took place between Belgian and European players (universities, research centres, etc.) which have been tackling this problem for years. This allowed us to produce an overview of the various solutions that guarantee good coverage in buildings, without compromising the residents' health. This is a fundamental aspect in the development of smart buildings.

In 2020, we will continue our work to better understand the current situation in Belgian residential buildings, but above all to disseminate the acquired knowledge as much as possible to construction professionals.

A tool to determine the acoustic performance of ventilation systems

In the past, you had to call in a consultancy office in order to be able to estimate the acoustic performance of a residential ventilation system. With the tool that we have developed during the past year within the framework of the 'Silencevent' research project, it is now possible to obtain an initial indication of these performances based on a few simple data.



The tool was placed online at the end of 2019 and is available via iiw.kuleuven.be/groept/silence-vent. It is aimed at designers and installers who want to know whether a particular ventilation system will meet Belgian acoustic standards. By entering the brand and the type of the ventilator, the silencer and the valve and the geometry of the pipe system into the spreadsheet, one immediately obtains an initial estimate of the noise generated by the ventilation system in each room of the building.

The tool includes all known acoustic characteristics of a large number of components available on the Belgian market. This information was supplemented with features measured by the KU Leuven.

In the past, consultancy offices had to calculate the impact of certain choices on the basis of various formulae. Thanks to this research project, supported by VLAIO, installers and architects now have a tool that takes over this difficult task.



The tool we have developed provides **added value** for installers.

Tests on glass guard rails

Glass is currently omnipresent in the construction industry (e.g. for stairs, floors, interior walls, etc.) and guard rails are no exception. That is why the 'Joinery and Façade Elements' laboratory carried out nearly 40 tests last year on – mainly glass – guard rails to assess their resistance to static loads (own weight, imposed loads and wind load) and dynamic loads (soft and hard impacts).

Moreover, thanks to the prenormative study 'Normative regulations for the design of guard rails for buildings', the BBRI was able to make an important contribution to the revision of Belgian standard NBN B 03-004. This study provided a lot of information with regard to the evaluation of static loads, the adjustment of the evaluation criteria and the drafting of a protocol for static and dynamic tests and of specific requirements for glass guard rails.

Thanks to the study, we were also able to determine the impact of the shape of the guard rails on the wind load. It also provided the necessary information on the dimensioning, execution and anchoring for the preparation of the TIN 'Particular glass structures', to be published in the course of 2020.

At the request of the Technical Committee 'Glazing', we are currently conducting an in-house study to draw up dimensioning tables for these elements. By using such tables, it is possible to determine the composition of the guard rail glazing in function of the support conditions (clamped, on two, three or four continuous supports), the dimensions, the function of the building and the location. This research is essential to complete the TIN 'Particular glass structures'.



The tests performed on glass guard rails enabled us to draft **dimensioning tables**.



The 'Construction Chemistry' laboratory detects and treats the pathologies of materials

To identify the causes of pathologies and provide solutions, the 'Construction Chemistry' laboratory examined more than 100 cases in 2019, by detecting the origin of corrosion phenomena, analysing infiltration water, studying the VOCs present in indoor air, eliminating efflorescences, examining traces of drips and stains on floor and wall coverings, etc.

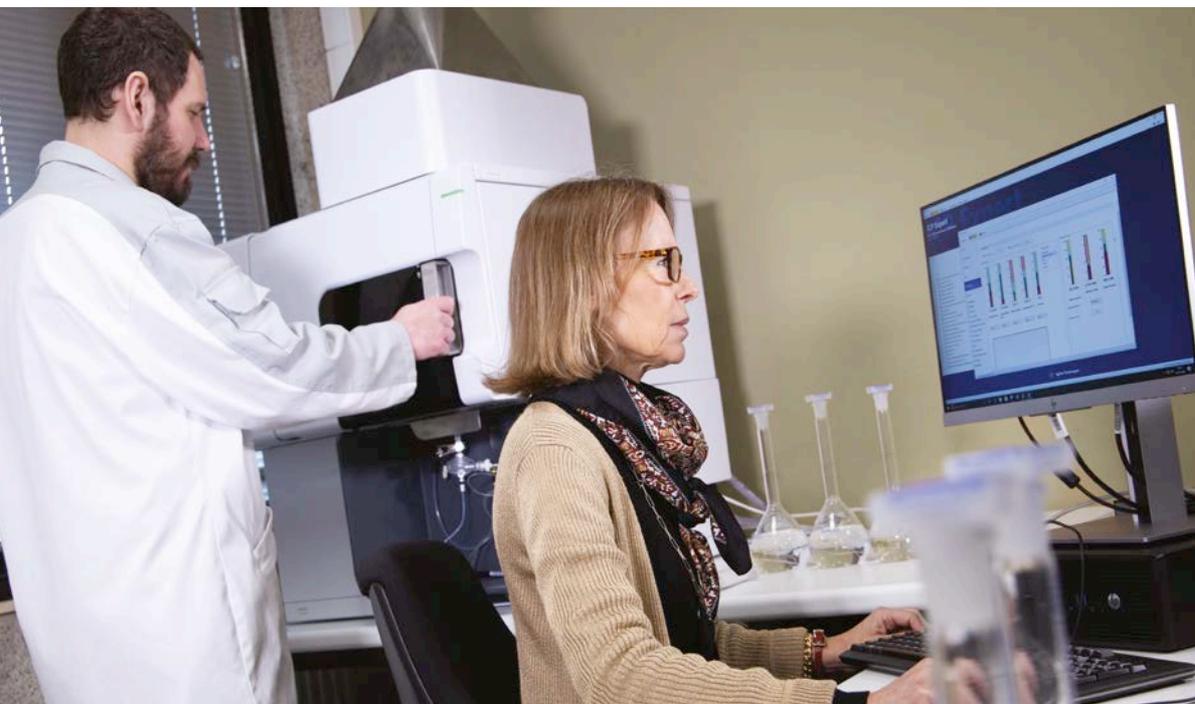
The laboratory has the expertise and resources to investigate all building materials (both mineral, organic and metal), making it a pioneer in analytical technology.

When concrete, screeds, plaster or a placing or jointing mortar fails to meet the required performances for a particular application, the laboratory can subsequently check the amount of cement and aggregates used for

production. Given the relatively large inaccuracies of the previously used method, a new method has been developed in collaboration with the CRIC/OCCN.

“At the moment, a new standard describing this method is about to be published,” says Head of Laboratory Pascale Steenhoudt. “We see this as the culmination of many years of research work, which has contributed to making this laboratory the reference in its field.”

In addition, we are using our technical skills and our advanced analysis equipment to support the other BBRI laboratories in their analysis and research work, in particular in the development of innovative and more environmentally-friendly materials.



The 'Construction Chemistry' laboratory is at **the service of the contractors.**

The Standards Antenna 'Indoor Air Quality'

While at first sight, healthy indoor air may seem trivial, air quality is nevertheless a factor that needs to be taken into account as from the design stage of a building, in particular when choosing the materials. This construction requirement was long considered less important, but today it is high on the priority list.

Indoor air quality affects the health and well-being of the building's occupants. Poor air quality can lead to cancer, chronic diseases and concentration problems. That is why construction professionals must ensure that the indoor climate in buildings remains healthy. This is exactly the field of the Standards Antenna 'Indoor Air Quality'. The purpose of this SA is to inform and advise the Belgian construction sector on the applicable standards and rules for the design, construction and maintenance of healthy buildings.

The team of this SA based their approach on three pillars of intervention: gaining control of indoor pollution sources, optimising the ventilation of spaces and reducing the penetration of pollutants from outside. This global strategy combines the skills of experts from complementary fields: chemists, geologists, microbiologists and construction physicists.

The main achievement of 2019 was the launch of a complete, educational and user-friendly website for smartphones, tablets and PCs. The Standards Antenna's mission to provide information and advice through public events and personalised support was also continued.



The Standards Antenna 'Indoor Air Quality' is an indispensable instrument for **more communication** with SMEs.



Technical installations



'SmartPower': the correct heating capacity for buildings

For heating systems in buildings, the rule of thumb used to be 'avoid under-capacity at all costs'. Having sufficient heating capacity at all times was the most important thing, even if this capacity was usually excessive. Today, in the 'SmartPower' project, we are currently looking for ways to determine more accurately the actually required heating capacity. New smart concepts of heat supply, such as heat storage, smart controls and flexibility allow a better coordination of supply and demand at all times. To apply these concepts in an optimal way, we need to be able to correctly predict the heat demand over the coming hours or days.

The 'SmartPower' project is now halfway complete. In 2019, our research team focused on the assumption that the current standard overestimates the required heating capacities, especially with low outside temperatures, and that heat generators could actually be dimensioned 10 to 30 % smaller. Many control systems rely heavily on the measurement of the outside temperature to continuously determine the necessary capacity. While outside temperature may well remain the single most important factor, we are also investigating systems that take into account wind, solar radiation and other heat gains. Adapting heating provision demand to these parameters will enable us to further optimise tomorrow's energy systems.

The project continues in 2020. The final results will not only be useful for the heating system designers and installers, but they will also contribute to a future, climate-resilient energy supply.



Our ultimate goal is an **energy supply** that can adapt itself to climate changes.



'SCools': sustainable cooling systems in buildings

The 'SCools' project starts from the observation that classical cooling installations are also increasingly being installed in homes, which was exceptional until recently. With the warmer climate, the increasing number of heat waves and better insulation and ventilation systems, the heat balance in buildings is shifting, which means that while we have to heat less, we also need to prevent overheating more frequently.

A lower heat demand in winter is interesting in the context of energy transition, but the flip side of the coin is that, when designing a new construction or renovation project, more attention needs to be paid to prevention of overheating. The best way to do this is to reduce heat gains or to use sustainable cooling systems, such as free geocooling

or ventilative cooling. However, there is as yet no practical method in Belgium for correctly designing this type of low-capacity technology.

In 2019, we performed a lot of measurements in our 'SCools' project and gathered information on sustainable cooling systems from our user group. We are currently working with the members of that group to develop a design tool to facilitate the comparison between the capacity and performance of various passive, sustainable and classical cooling strategies.

In this way we help installers and designers to select optimal, sustainable (combinations of) cooling technologies.



The aim is to assist the sector in choosing **optimal and sustainable** cooling technologies.

'C-Bridge': towards a wider use of composite bridges

Composite bridges, or bridges built in fibre-reinforced plastics, offer a very interesting alternative to bridges made with traditional building materials. Composite is not only stronger and lighter than concrete and steel, but also more durable than wood and it also requires less maintenance.

Today, the number of composite bridges in Belgium is still limited. The reason for this is that the benefits of this material are insufficiently known and there are no specific regulations. For the Technology Transfer project 'C-Bridge', the BBRI is collaborating with UGent (University of Ghent) to collect and process data from home and abroad in order to make composite bridges usable in practice.

Furthermore, the BBRI and its partner Seco won the public tender by De Vlaamse Waterweg and the Flemish Public Service Mobility and Public Works to monitor composite bridges in Bruges. The design of the bridges was evaluated and validated by Seco at the end of 2018. At the beginning

of 2019, the BBRI integrated several optical fibres cables into one of the bridges. This allows us to evaluate the deformations under static load, and also monitor how the material behaves under the dynamic loads of pedestrians, joggers, cyclists and other users.

This last assignment is a good example of cooperation with external partners and between different laboratories within the BBRI. The close, dynamic and enthusiastic collaboration between the 'Structures and Building Systems' laboratory and the 'Geotechnics and Monitoring' laboratory has made this project an even greater success.



More cooperation **to stimulate the emergence of new materials.**

TIN 270 on rainwater drainage

The dimensioning of rainwater gravity drainage systems is an important task in which many different construction trades are closely involved. However, strictly applying standardised methods is tedious work. For this reason, at the request of the installers of the Technical Committee 'Sanitary and Industrial Plumbing, Gas Installations', we have elaborated a clear design and dimensioning method. This method was central to TIN 270, a publication drafted in collaboration with the members of this Committee, the members of the Technical Committees 'Roof Coverings' and 'Sealing Works' and manufacturers' representatives.

With the different available methods for dimensioning resulting in contradictory results and with no information on the capacities of round drainage openings in roof curbs, we built two made-to-measure test installations. Once we obtained the measurement results, we were then able to select the most correct dimensioning method and to complete the missing information.

The chosen calculation method proved, however, quite complex. For this reason, we decided to convert the formulae into tables and graphs based on results for standardised gutters and frequently occurring

water heights on flat roofs. The highly simplified method means that contractors no longer have to perform the calculations for ordinary buildings.

In addition to this Technical Information Note, we will be publishing another report in 2020 that explains the entire calculation method in detail and that is more oriented towards consultancy offices. With these two documents we will be able to offer all the available information on this subject.



A TIN to simplify the **dimensioning** of rainwater drainage systems.



Calculation tool for sanitary expansion vessels

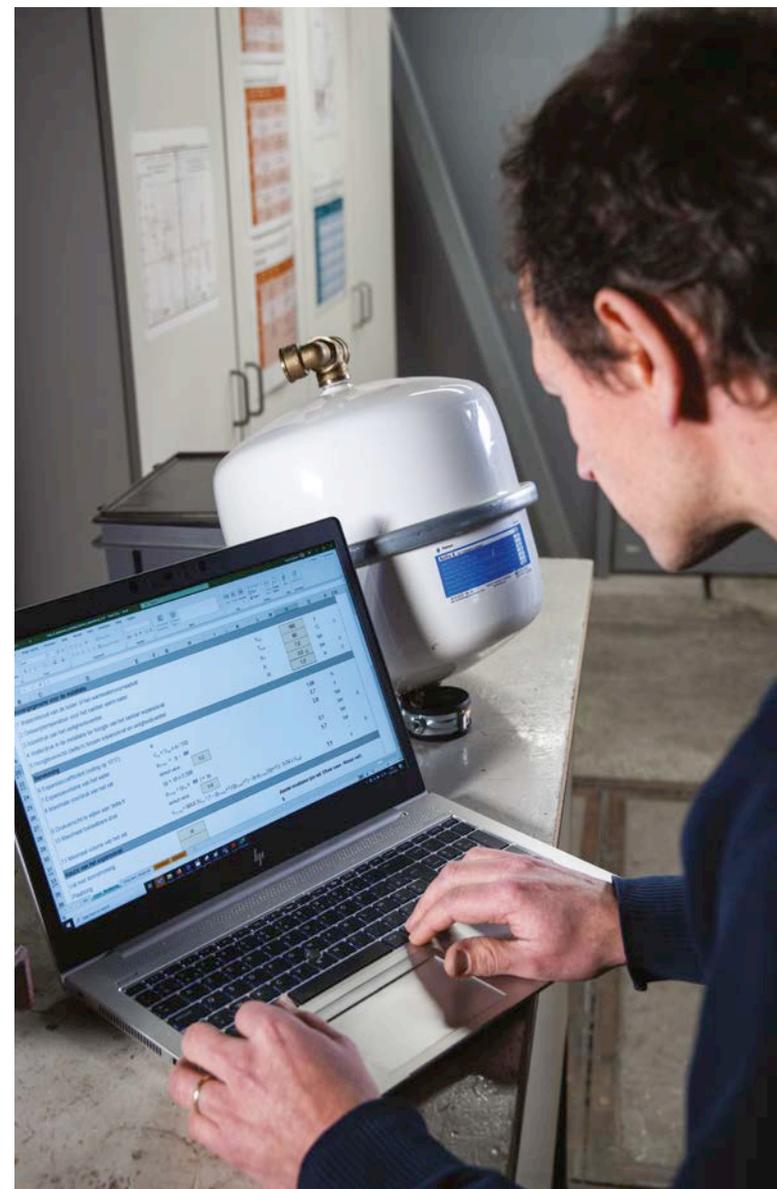


This tool was developed **at the request of the installers of sanitary facilities.**

In 2019, the 'Give Me Five' action plan resulted in a number of reflections in the Technical Committees (TCs) on the services provided by the BBRI to its members. During the brainstorming session of the TC 'Sanitary and Industrial Plumbing, Gas Installations', installers formulated a clear request for easy-to-use calculation tools. Sanitary installers often have to perform very precise calculations.

In practice, the dimensioning of technical installations presents problems mainly for small-scale projects for which installers cannot count on consultancy offices to perform the calculations. In order to correctly accommodate the expansion of hot water and avoid overpressure, installers of sanitary expansion vessels need an easy way to determine the required volumes.

To meet this demand, the BBRI developed a calculation tool in 2019 for determining the volume of expansion vessels. Besides the calculation tool, we have also included a database of around 300 expansion vessels available on the Belgian market. In just a few clicks, installers have a selection of products that meet the theoretical criteria of their search.



Construction 4.0 and management



Making digital technologies better known and more accessible

The BBRI wants to bring construction professionals into contact with new digital technologies by making them applicable in an intuitive way. We are currently developing our Construction 4.0 Centre in Sint-Stevens-Woluwe with support from the European Regional Development Fund (ERDF). In this demo centre, we will be providing demonstrations, guidance and advice on all aspects of new communication tools and innovative construction equipment.

To give a preview of this centre, we organised a demo event in November 2019, that was part of a visit by the agency Flanders Innovation & Entrepreneurship (VLAIO). There we demonstrated seven new technologies that can be used on the construction site of the future. Thanks to virtual reality, our guests were already able to visit part of the future demo centre. In this way, they could not only visualize how the building will look like in the future but it also demonstrated the usefulness

of visualisation technologies. Drones and photogrammetry illustrated, for example, how roofers can be assisted, and with a mobile 3D concrete printer we demonstrated how concrete works can be programmed to suit the needs of a construction site. Visitors could also discover all the various possibilities of acoustic cameras for visualising acoustic leaks, of exoskeletons to facilitate the execution of heavy tasks and of laser scanning for rapid on-site measurement. Finally, augmented

reality enabled them to discover how certain data – for example sub-items from a BIM (Building Information Modelling) model – can now easily be visualised on site. With some 80 interested participants, the demo event was a great success!

In the coming months, we will be further developing this type of demo set-up, which will allow us to continue to disseminate knowledge on the usefulness of numerous technologies for the major construction trades.



Digitisation serves the entire sector.





The Summer University 2019 functioned as a training lab on **smart buildings and smart construction sites**.

Converting smart construction sites into smart buildings

In September 2019, a new edition of Summer University was organised in collaboration with CCBC, CCW, ADEB and Cefora. This time, two innovative and exciting themes, smart buildings and smart construction sites, took centre stage.

In recent years, we have seen a clear trend towards interconnecting objects, buildings, neighbourhoods and cities and to make them intelligent. Behind these concepts lies the digital revolution, which is radically changing all sectors of society, including the construction sector.

To create an intelligent building, it is essential to take smart technologies into account from the very start of the design process. And more generally, applications based on the Internet of Things (IoT) can also be very useful in the implementation phase. Hence the term smart construction sites.

Summer University 2019 enabled us to frame the context and challenges of smart buildings: wireless communication, cybersecurity, data protection, etc. Practical examples supplemented with testimonials served to illustrate the different application areas of smart. The 200 participants were also able to discover concrete solutions that are available on the market, both for buildings (access control, intelligent glazing, air quality management, etc.) and for construction sites (concrete drying, monitoring of structures, geolocation, etc.).

'Icarus'

A drone on a construction site is no longer an image from a futuristic film. Partly thanks to the 'Icarus' research project, the BBRI now has four certified drone pilots, who are available for 3D measurements, material recognition, damage assessment, inventory work, demonstrations to building contractors and for discussions or problems on a construction site. Quite simply, drones make it possible to map hard-to-reach places in a very efficient and simple manner.

These certified pilots now fly drones that were purchased following extensive analyses in the context of 'Icarus'. In 2019 we did everything possible to make the BBRI fully operational in this area, in order to assist contractors and construction professionals with this new technology from 2020 onwards.

During a discussion on a new construction site between a contractor and

an architect on whether the plans had been followed correctly, the drones immediately demonstrated their value. The building, which has many angles and inclined surfaces, could be measured and mapped by using photogrammetry and with the help of a drone. In this way, the work performed could be compared very quickly with the plans, without the need for a technical adviser to measure up the entire building.

In addition to the first experiments with drones, the 'Icarus' project also undertook research into the automatic and semi-automatic recognition of building materials, a method that is particularly useful in renovation and restoration work. Multi-spectral images and grey-scale texture analyses were used for this study. The positive results of the first small tests show that this technique offers considerable potential in the near future.

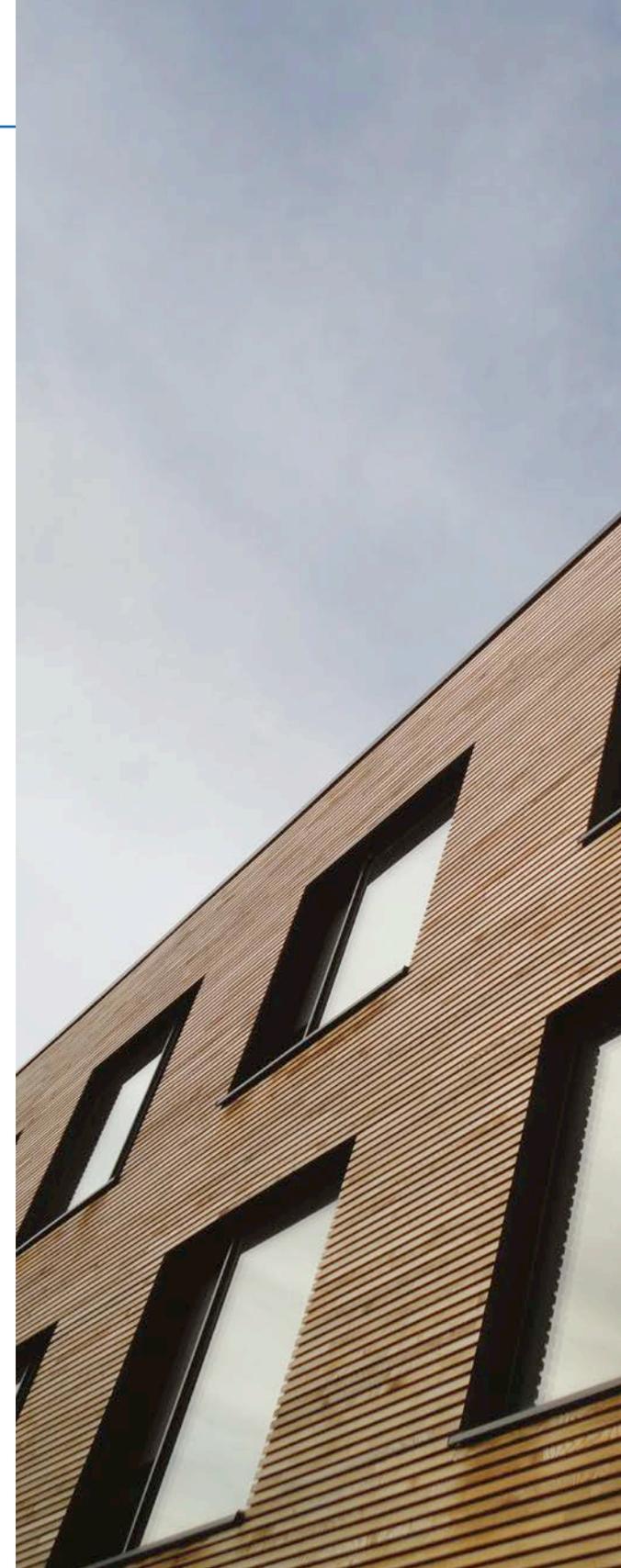


The use of drones on construction sites **simplifies** certain tasks.

A calculation tool to determine joinery performances

The BBRI's 'Technical Advice' (ATA) division is often confronted with problems related to water infiltration through windows and doors. To prevent such problems from occurring on the construction site, the 'Joinery and Façade Elements' laboratory is working with the 'Digital Construction' division at the request of the TC 'Joinery' to develop a software tool to assist joiners in choosing exterior joinery. This project illustrates how good cooperation between different divisions and the Technical Committees can result in concrete applications for our members.

Most cases of water infiltration submitted to the ATA occur in places where windows and doors are heavily exposed to bad weather conditions: in buildings in open environments and in high or south-west-facing façades. Many times these problems can be solved after installation, for example by improving the airtightness of the windows, closing gaps between the outside and inside environment, increasing water drainage from the decompression chamber, or evening out the pressure between the decompression chamber in the window profile and the outside environment or sealing corner joints. However, the preferable solution is of course to avoid these problems by choosing a suitable window, in which the environmental parameters (wind and rain load) are correctly estimated prior to the installation.





The calculation tool we have developed allows project information to be entered manually, but we are also working on integrating it into BIM (Building Information Modelling). Based on the data included in the model, the software tool will assist joiners in correctly interpreting and applying the Belgian standards for joinery and glazing. These standards will also help to determine the required airtightness, watertightness and wind resistance performances of the windows and define the required shock resistance of the filler panels. If necessary, the tool will indicate whether to install a guard rail and indicate the required type of breakage for windows with glass filler panels. This avoids having to make adjustments on the construction site and the contractors know in advance which aspects they have to take into account.



A tool **fully adapted** to the joinery requirements.

Minister Willy Borsus attends the Conference on Construction 4.0 in Limelette



Digital technologies **are breathing new life into the construction sector.**

As part of the 'Build4Wal' project devoted to new technologies, the BBRI organised the conference 'Construction 4.0' on 12 December 2019.

"This event, organised in collaboration with the GreenWin cluster, was devoted to innovation for the construction sector," explains Benoit Parmentier. The success of the conference is evident from the number of participants: 180 people travelled to Limelette to take a closer look at the challenges relating to digital construction and the transformation of construction companies.

The conference started with a speech by Olivier Vandooren on the digital challenges within the BBRI (one of the main axes of the 'Give Me Five' internal transformation plan). Thomas Vandenberghe (BESIX) then spoke of his company's experiences in the field of innovation and the implementation of digital technologies in the sector. Afterwards, two sessions were held with presentations and debates on new construction and on renovation.

The introductory speech to this latter session was given by Willy Borsus, Minister of Economy, Research and Digital Innovation, who took the opportunity to visit the BBRI experimental station in Limelette.

At the end of the day, the Minister and all participants were able to discover and test out a number of interesting digital technologies for the construction industry: automatic detection of safety helmets, a drone fitted with a thermal camera, a 3D scanner, a virtual reality headset, BIM for contractors, an acoustic camera and an exoskeleton.

Consolidation centres: new solutions to improve the supply chain of construction sites

Today we observe a lot of waste in the supply chain of building materials to construction sites (oversupply, relocation, waiting times, quality problems, etc.). To address this problem, two complementary research projects have been launched.

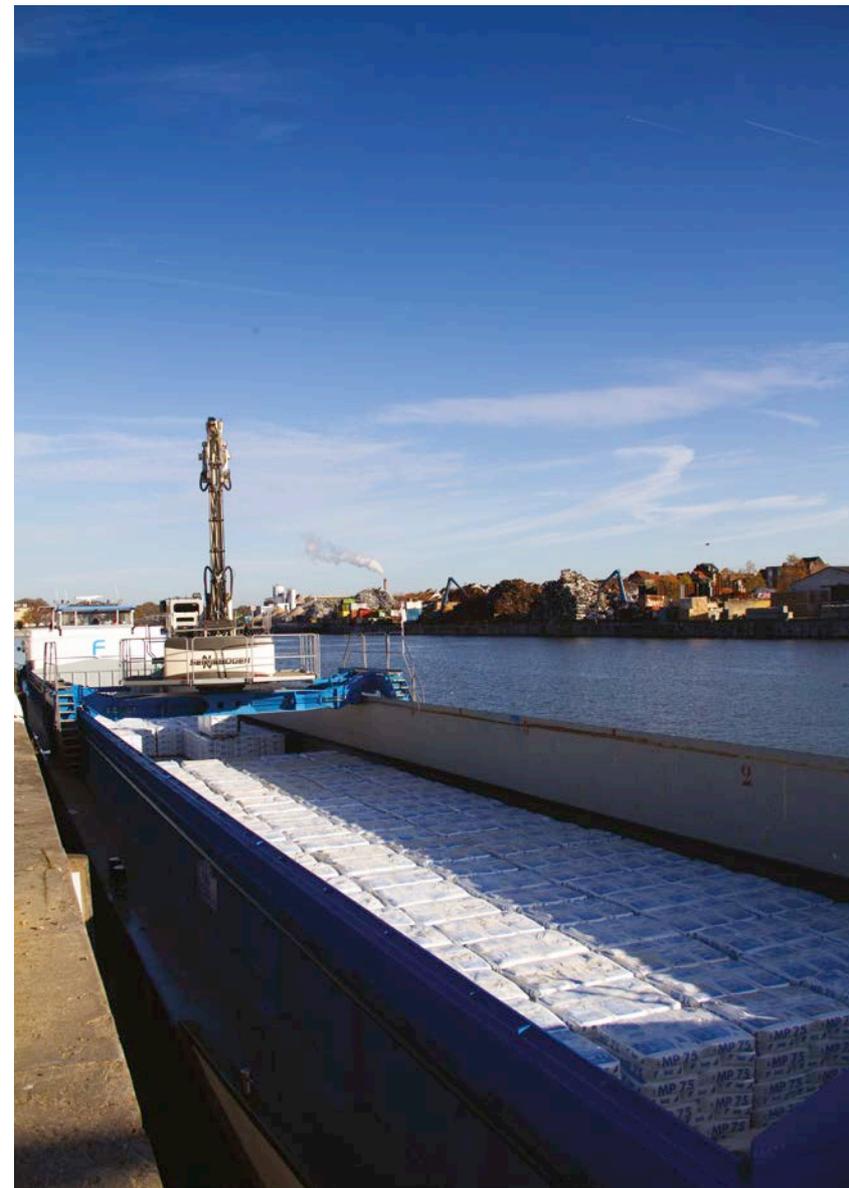
The purpose of the BCCC (Brussels Construction Consolidation Centre) project, supported by Innoviris, is to set up a consolidation centre in Brussels (and an associated IT platform), to perform on-site testing and at the same time to measure the impact on the environment and on the economy. This is a logistics platform for the transit of goods from suppliers to the construction site. According to Florent Suain of the 'Management and Quality' division, this type of platform can reduce the risk of simultaneous deliveries, avoid the arrival of insufficiently filled trucks on the construction site and improve the punctuality of deliveries.

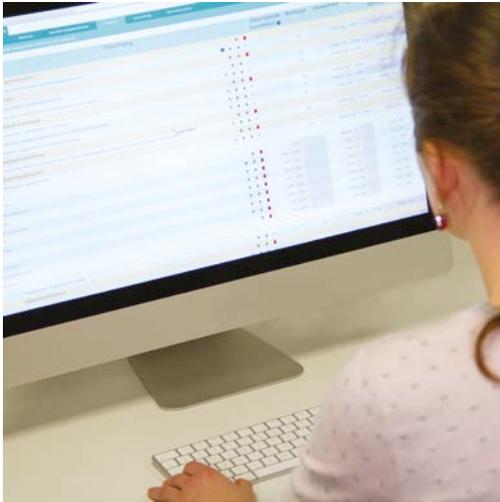
With the support of the Flemish Institute for Logistics (VIL), we wanted to use the second project, 'Bouwhubs', to check the profitability of a consolidation centre as according to the location, size and number of construction sites to be supplied. In this way, various simulations were carried out for a centre in Antwerp.

Materials transportation in its current form poses major environmental and mobility problems. "Improving logistics will reduce the number of trucks on the road, lessen the environmental impact and provide an economic return," says Matthijs Lamote of the 'Management and Quality' division.



By improving logistics, we can reduce the environmental impact.





cpro is **an essential tool** for SMEs to optimise their price estimates.

cpro, the BBRI's management tool

Producing a good price estimate is no easy task. Many elements have to be factored in: the anticipated deadline, the costs of materials, machines and subcontractors, construction site installation costs, general and other costs.

The BBRI assists contractors in this very important task. “The management and price calculation tool cpro developed by the ‘Management and Quality’ division is available online to all members. With this tool they can monitor the financial aspects of projects and produce quotations, progress reports and invoices”, explain Maxime Janssens and Mike Bogaerts of the ‘Management and Quality’ division.

“cpro stands out from other digital solutions and is really impossible to ignore thanks to features such as the methodology for splitting out the different items by activity sector in order to calculate unit prices, the possibility of implementing the specific cost structure of each enterprise, and the option of integrating other information, such as specific material properties or loss/waste indicators.” The fact that the individual items are aimed at complying with the recommendations of the TINs and other reference documents is an added value. For example, cpro remembers that large tiles require double bonding.

In 2019, software sensitisation or training courses were held in more than 400 companies and over 70 training modules were organised.

In addition, a new version of the tool has been developed to make it even more accessible and intuitive. A number of demonstrations were also given, notably at the ‘Digital Construction Brussels’ fair. The ‘Management and Quality’ division is improving the software year after year and is determined to continue doing so in 2020.

Bringing companies together to find innovative solutions for the buildings of tomorrow



After the successful clusters BIM (Building Information Model/Modelling/Management) and Building Industrialisation, the new BBRI cluster 'Smart Buildings in Use' was established, focusing on the technologies applied during the use phase of buildings.

The members of this cluster are investigating how new technologies such as the Internet of Things, sensors and even drones can contribute to the use, management and maintenance of buildings. Construction companies too are increasingly involved in this phase, for example in the context of DBFM (Design, Build, Finance and Maintain) projects.

An example is the use of sensors that measure whether people are present in a certain room, making it easier to find a free meeting room or workplace. The same sensors can also be used to plan cleaning operations or to control the ventilation.

After one year, the cluster has 35 members who are pioneers in their field: construction companies, building managers and manufacturers of building materials and technical equipment, sensor manufacturers and developers of internet platforms. This diversity is producing a lot of cross-pollination. New companies are still welcome to join.

In 2019, the BBRI organised a dozen of seminars, brainstorming sessions and network events. In concrete terms, the project '*Onderhoudsplanning 4.0*' ('Maintenance planning 4.0') was also launched last year, focusing on a more efficient exchange of information around maintenance planning. Together with our members, we have also started to draft a guide to help building owners in drafting appropriate instructions for smart buildings.



With the clusters we want to **promote innovation** through cooperation.

Building materials and systems



Bio-based materials

In order to provide more environmentally friendly solutions and to ensure the permanent availability of products on the market, the construction industry is constantly looking for new materials. This also includes bio-based materials, which are increasingly being used and diversified. Although not really new, these materials are not yet very industrialised. As a result, the properties and performances must be better analysed to ensure that they meet the requirements and to answer questions of contractors, who ultimately need to ensure that the materials are performing correctly.

In 2019, the BBRI continued an extensive study campaign (including the projects 'CBCI', 'BIOCLAYMASONRY' and 'HETREFORT') by increasing the characterisation tests to define the performances of bio-based products (hygrothermal performances, vapour transmission, acoustic properties, mechanical resistance, etc.). With these studies, we are aiming for the most sustainable and circular use possible. Undertaken in collaboration with manufacturers and a number of research centres and universities, these studies enabled various informative and normative documents to be drafted, in particular the amendment of the *Cahier des Charges type Bâtiments 2022* (CCTB 2022, Walloon Buildings 2022 Standard Specifications).

Information sessions will also be organised, discussing the limitations and uses of these new materials. In this way we want to help contractors to make the right choices and prevent loss of performance or degradation of these elements on construction sites. This research is not just limited to products, but it also includes the concepts of bio-based walls and buildings.



Source: Isohemp



We need to know the limits of **innovative materials** in order to stimulate their use.

New 'sustainable materials' clauses added to the CCTB Standard Specifications

To promote sustainable construction and renovation, the Walloon government (*Service public de Wallonie, SPW*) issued a tender at the end of 2018 to supplement the Walloon Buildings 2022 Standard Specifications (CCTB) with new regulations for 'sustainable' materials. These materials are used in various building applications: straw- or wood-concrete blocks, hemp concrete, raw earth masonry and hemp lime blocks, wood-concrete walls, clay-based plaster, bio-based insulation materials, etc.

In 2019, 140 new technical clauses were drawn up by the BBRI in collaboration with the *Confédération construction wallonne (CCW)*, the *Union wallonne des architectes (UWA)* and the '*Architecture et nature scrl*' consultancy. The supervisory committee, consisting of representatives of the SPW and of the clusters 'Ecoconstruction' and 'Cap Construction', monitored the tender process.

The latest version of the CCTB Standard Specifications was published at the end of 2019 on the website <http://batiments.wallonie.be> (in French only). This

document can be very useful for, among others:

- prescribers, by providing them with a database of 'sustainable' materials in order to draw up their special specifications
- producers, who benefit from a reference system that contains the necessary characterisations of their products and construction systems
- contractors, who in this way receive relatively clear instructions to carry out the prescribed work.



This **partnership** has led to 140 new clauses.



The 'Rainroof' project analyses the watertightness of roofs

With the exception of the CEN report CEN/TR 15601, there is no Belgian or European standard that qualifies the behaviour of roof coverings in case of torrential rain. As part of the 'Rainroof' project, we reviewed this document in order to propose a classification, an analysis grid and more precise testing methods.

For example, the team of the 'Insulation, Sealing and Roofs' laboratory demonstrated that the aforementioned report does not provide for testing the intermediate layers of roofs (roof decking, roof/roof deck combinations, sandwich panels or inserts such as windows, domes, chimney pipes, etc.) and that it does not take into account the drying possibilities of the roof (and therefore the insulation) and the lathing.

Furthermore, through tests conducted in the course of 2019, we found significant leaks (even for commonly sold slates and roof tiles) when the roofs were subjected to the in the report defined climatological conditions, without even applying air pressure which simulates the wind load effects. Where a roof deck is present, the combination of roof deck/roof covering prevents leaks, except in the case of significant underpressure.

It is important to continue these studies and to determine the risk of deterioration of the interlayers (lathing, roof deck) in the event of repeated water infiltration into the roof complex. The risk of biological attacks, vapour transmission to the insulation and similar situations needs to be studied in combination with the possible ventilation of the intermediate layers. The research will therefore continue in that direction.



Knowing the watertightness of roof coverings is an **important added value** for roofers.



ETICS: thorough implementation of innovations through knowledge sharing



The **new TIN on ETICS** in the spotlight.

In the areas of energy, sustainability, fire and acoustics the bar is being raised ever higher. ETICS (External Thermal Insulation Composite System) is an increasingly popular choice for exterior insulation. In these systems, the insulation is fastened to the load-bearing wall and finished with a plaster or hard covering. Over the years we have done a lot of research on this topic. In 'ETICSiv', a VIS project conducted in collaboration with the *Confédération Construction Parachèvement*, Bouwunie and NAV, the emphasis was on ETICS with hard coverings, such as brick strips, ceramic tiles and natural stone strips.

In 2019, our goal was to disseminate the knowledge gained. The main activity was the preparation of a Technical Information Note on ETICS with hard coverings. This was discussed in a working group comprising some twenty experts from the sector (contractors, manufacturers, supervisory bodies, experts).

This resulted in the publication of five articles in professional magazines, construction site visits and technical support to companies. We also organised ten information sessions for contractors and architects. In addition, a dozen of data sheets were produced in 2019 on specific aspects of ETICS, with particular attention to the wall base. These sheets will be included in the database of the Standards Antenna 'Construction details'.

By offering this kind of adapted, practice-oriented information, we want to further increase the construction professionals' confidence in ETICS.

'Clean.ETICS': guidelines for cleaning biologically contaminated façades

Biological contamination of the plaster finishing of an ETICS system is a common problem. This pollution often consists of algae, cyanobacteria and/or fungi. There is currently no suitable method for cleaning these façade surfaces which effectively removes the various micro-organisms while taking into account the vulnerability of the material.

The 'Clean.ETICS' project sets out to develop guidelines based on a well-substantiated methodology. The 'Microbiology and Microparticles' laboratory and the 'Building Materials' laboratory are therefore studying the effect of techniques such as applying (bio)chemical cleaning agents, physical cleaning methods (pressure or steam hosing) and a combination of the two.

To date, 13 different products have been selected for testing. Their effectiveness against representative fungal species was investigated in the laboratory in 2019. The testing of the effectiveness against algae and cyanobacteria is still ongoing. The investigation into the risk of damage to mortar and materials commonly used in the façade (plastic and aluminium profiles, bluestone, etc.) has almost been completed, while that of the effect of physical cleaning is planned for the coming months.

Once all results have been recorded, the next step will be to develop cleaning guidelines. In the field of prevention too, further long-term research is necessary, in collaboration with the sector.



Various **cleaning techniques** are undergoing thorough examination.



A challenging project for producing custom-made fibre-reinforced concrete

Niras, the institution which manages radioactive waste in Belgium, asked us to develop a steel fibre-reinforced concrete together with UGent (Magnel laboratory, University of Ghent) as an alternative to a classical steel-reinforced concrete solution. This could then be used for constructing the top slab, the massive concrete slab that covers radioactive waste storage sites.

In this project, we explored the limits of what is possible with classical fibre-reinforced concrete. Strict requirements were set for the composition and mechanical behaviour of hardened fibre-reinforced concrete. For example, Niras asked us to ensure that the concrete exhibits multiple cracking behaviour. This means that if the concrete slab starts to crack, several fine cracks will develop instead of one large crack. This requirement was a huge challenge, requiring a major increase in the fibre dosage. This, however, compromised the workability and homogeneity of the concrete.

The extensive knowledge of the 'Structures and Building Systems' laboratory and of the 'Concrete technology' laboratory was brought in to help solve this problem. The problem was the absence of any standard testing method to evaluate multiple cracking behaviour. Different fibre types, dosages, compositions, granulates and sands were tested and more than 10 m³ of fibre concrete was produced. In the end, we managed to develop not one, but two concrete mix types that meet the imposed requirements.



Collaboration and professional knowledge are the key to achieving a goal.



Different approaches to lower the environmental impact and increase the circularity of concrete

In certain project specifications, the environmental impact and the circularity of materials is becoming increasingly important. The various possibilities with regard to concrete are being investigated by the research teams of the 'Concrete Technology' and 'Sustainable and Circular Solutions' laboratories, in close collaboration with companies and various research institutions. This should promote standardisation and allow contractors to innovate and to confidently use concrete with a lower environmental impact than traditional concrete.

In 2019 we focused on various projects and studies. The 'RecyBeton' prenormative study for example, undertaken in collaboration with CRIC/OCCN and CRR, made it possible to extend the scope of application for recycled granulates in the Belgian concrete standard (NBN B 15-001). The 'Sand2Sand' project, in collaboration with four pioneering companies, demonstrated that recycled crushed sand can also be used in concrete. In the 'Granisec' prenormative study, carried out in collaboration with CRIC/OCCN, a methodology is also being developed to assess the suitability for the use in concrete of inert secondary granulates from waste streams other than construction rubble.

Many other technologies exist to reduce the environmental impact and/or to optimise the life cycle of concrete. In the 'Circular.Concrete' project we are closely following these innovations and we are giving guidance to those interested in their application.



Innovation is enabling us to optimise the life cycle of concrete.



The Standards Antenna 'Tolerances and appearance'



In an increasingly demanding industry where more and more rules apply, the Standards Antenna 'Tolerances and appearance' (Eye Precision) aims to inform professionals as well as possible on existing standards and evaluation criteria and wants to help them interpret and adhere to these standards during all phases of the construction process. This BBRI Standards Antenna was designed with the support of the FPS Economy to avoid any disagreements on the tolerances and appearance of structures as much as possible.

Our team ensures that the acceptance criteria in terms of tolerances and appearance are summarised, grouped and kept up-to-date for all domains of construction, both for structural work (concrete, timber construction, masonry) and for finishing (wall tiles, screeds, stairs, joinery, suspended ceilings and light partitions, wooden terraces, paintwork and more).

Significant preparatory work has enabled us to collect and publish online all values related to the acceptance criteria in order to simplify access and use by contractors and builders. In 2019, we also decided to supplement our current information sheets with short videos on the applicable measurement methods. The first six videos will be available online in the course of 2020.



Communicating even better on tolerance criteria.



Environment and circular construction



The reuse of building materials

The European ERDF project '*Le bâti bruxellois, source de nouveaux matériaux*' (BBSM, Existing Brussels buildings as a source of new materials) focuses on the reuse of building materials. Enthusiasm in the sector for this subject is currently very high, given the strong commitment to the circular economy and to reducing the environmental impact of buildings.

As this emerging domain is not yet well defined (because of technical, legal and operational uncertainties), we proposed a method for evaluating the technical performances of reused materials and components in 2019. Obviously, we strive for equal confidence in these materials as in new materials and we want to steer the sector towards reuse as much as possible.

We are also collaborating with other European countries in the Interreg project 'FCRBE' (Facilitating the Circulation of Reclaimed Building Elements in Northwestern Europe), which aims to increase the amount of reused materials by 50 % in Northwestern Europe. To achieve this, we have developed, among other things, a handbook to help professionals identify potentially reusable products in buildings destined for demolition. This large-scale project will open the way to the development of a number of innovative tools, thanks to the cooperation of all parties involved: architects, contractors, consultancy offices, etc. The idea is also to harmonise and improve practical applications by drawing inspiration from each other.



Providing a framework to stimulate
the reuse of materials.



'ProReMat'

'ProReMat' is a good example of a project in which concrete questions from a company have led to results that will benefit the entire sector.

The request to integrate more recovered materials into its purchasing policy came from the Van Roey Group. Jeroen Vrijders and Aline Vergauwen from the BBRI set to work together with the contractor. Collectively, they submitted a grant application to Vlaanderen Circulair before launching the project.

First of all, the BBRI produced an overview of the market supply of reused and recycled building materials. We then looked at the technical performances and the level of reliability that can be expected from these materials. The Institute has also investigated the possibility to apply these materials easily and cost-efficiently in a concrete construction project.

This gave Groep Van Roey knowledge on ways to integrate more circular materials into its purchasing policy. In addition, a database was made available via proremat.be, which contains various circular building materials. This database is a source of useful inspiration for every contractor working on circular construction. This project thus generates output for the entire sector.



The **entire sector benefits from this study** conducted for an individual company.



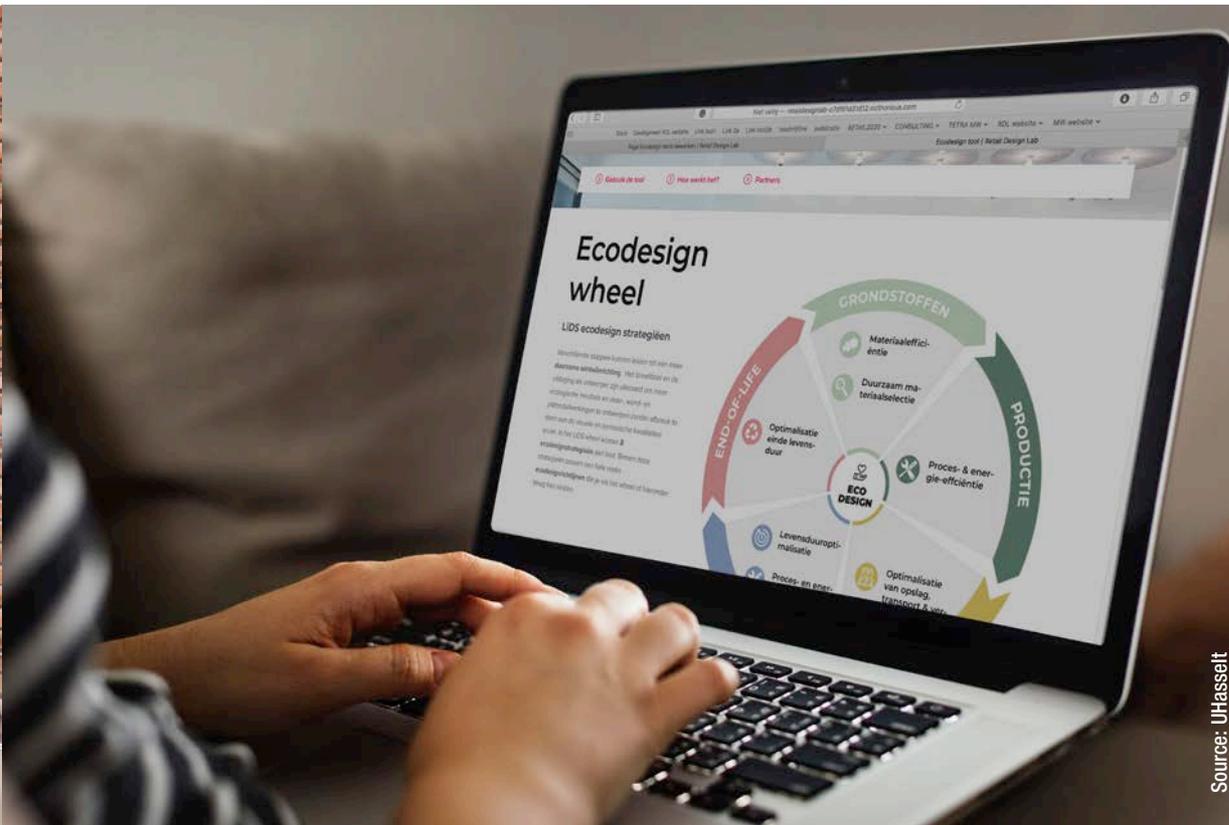
Source: Groep Van Roey

Choosing materials with attention to design and sustainability

With our 'Material World' project, we wanted to help retailers to pay more attention to sustainable materials for their store design. As stores are redesigned on average every seven years, there is great potential for introducing circular design principles, reusing materials and selecting environmentally friendly materials. The project included the development of a set of eco-design guidelines with which construction professionals can set to work.

In order to be able to offer even more concrete insights, we looked for specific applications for retail premises. Life cycle analyses were performed to calculate the environmental impact of different floor, wall and ceiling structures. This data was used in 2019 to develop an online tool for the comparison of different systems applicable in the retail sector, not only in terms of appearance but also in terms of environmental impact. Hence, designers and installers can take the ecological aspects into account in their selection processes.

For this project, we worked together with Hasselt University and wood.be, the knowledge centre for the wood and furniture industry. Their design knowledge and our technical support complemented each other well. Working together in this way, we achieved a good result, in which experience and sustainability go hand in hand.



Source: UHasselt



It is important to **promote** the **circularity of materials** intended for store interiors.

'B-LCA': objective life cycle analyses for the construction industry

The construction industry is paying more and more attention to the environment, not only in terms of energy consumption, but also with regard to the impact of different materials. Life cycle analyses (LCA) are therefore used increasingly. The LCA method makes it possible to quantify the environmental impact of a building material, building element or entire building over its entire life cycle. However, there is a need for objective data and tools to perform the measurements.

In 2012, the European standards NBN EN 15804 and NBN EN 15978 were published. These standards describe the calculation rules for carrying out an LCA, at product level and at building level respectively. At the BBRI, we are examining which aspects of the European standards lack clarity and how we

can clarify and supplement them with data that is representative of Belgium. Based on the results obtained, general calculation rules for Belgian EPDs (Environmental Product Declarations) have been drawn up, which contribute to clearer environmental data on building materials.

In 2019, we conducted a number of case studies to better understand the overall environmental impact of buildings and the relevance of the different components (e.g. the importance of operational energy in relation to the impact of building materials and installations). The methodological aspects of LCA were also discussed. For example, how can we include the production of renewable energy, renovation, recycling and reuse in the LCA? It is very important that we correctly integrate these aspects into the Belgian tool TOTEM.



Optimising the total environmental impact of buildings at Belgian level.



Energy



The 'Hygrimpact' study

To support the evolution of the standards for insulation materials, the 'Hygrothermy' laboratory has commenced the 'Hygrimpact' prenormative study. With this study, we want to get a better idea of the impact of the hygrothermal properties of materials on the thermal performances and the comfort of buildings. It is a well-known fact that the moisture content of an insulation material has an influence on its thermal performance. The study sets out to investigate the entire range of factors that determine this moisture content: the composition of the material itself, that of the wall in which it is located and the different environments that interact with this wall.

Twenty innovative insulation materials (or materials whose performance has not yet been sufficiently described) were analysed on the basis of various on-site monitoring sessions and laboratory tests. The research focused on their ability to absorb humidity (hygroscopicity) and on the evolution of their insulating properties as a function of their moisture content. A number of so-called 'critical' walls were also examined, which promote the humidification of the insulation material because of their composition or design. Finally, the project also focused on the building in general (analysing how climatic fluctuations impact the sensitivity of the walls and hence their robustness).

With the cooperation of the sector (material manufacturers and suppliers, as well as contractors and clients), the 'Hygrimpact' study enabled us to conclude that a moisture-sensitive material can lose up to 10 % of its insulating capacity in a moist environment.



Gaining a thorough understanding of **the influence of humidity on the thermal performances** of innovative insulating materials.



Hemp lime, a promising product that is still insufficiently known



With its ‘Hemp Lime’ project, the BBRI is investigating the performance of applications based on hemp lime, a building material produced by mixing the woody part of the hemp stem with lime, water and additives. Hemp lime is a promising product that also offers many ecological advantages.

However, we observe that contractors are still insufficiently knowledgeable about hemp lime-based products. In addition, faulty design or execution can lead to inferior performances of the material and can even cause damage. All this pointed to the need for clear and scientifically substantiated information about this product, for example when it can be applied and in which situations caution is required.

In the past year we therefore subjected the material to various laboratory tests. We also examined the product on a larger scale on various test walls in our experimental station in Limelette. Furthermore, we have started long-term measurement campaigns in five buildings. The insights gained in this way will be integrated into guidelines that will provide support for the decision making process and during the design and execution phases. In this way we want to guide construction professionals in the correct application of hemp lime-based materials.

The ‘Hemp Lime’ project is a collaboration with Hasselt University and the independent knowledge platform Pixii. The project is about halfway through and is being monitored by a user group of contractors, architects, producers and various knowledge centres experts. The first concrete results are expected soon.



Moving towards guidelines for the design and implementation of **hemp lime-based materials**.

'BE REEL!'

With energy consumption 70 % above the EU average, the energy savings potential in Belgian homes and apartments is considerable. The EU Life project 'BE REEL!' wants to give a significant boost to the realisation of both Flemish and Walloon ambitious renovation objectives by means of a number of levers.

In cooperation with the regional energy administrations VEA and DG04 and the persons responsible for pilot projects of five Belgian cities, the BBRI is making the most relevant knowledge and tools available to contractors and other construction professionals. These will enable them to expand their ability to carry out quality renovations in full confidence.

Launched in 2019, the be-renovatief.be website compiles recent technical information specifically aimed at professional builders and developers, architects and engineers, material producers and contractors.

The research results are disseminated in the form of practical information packages and workshops on various renovation topics. This information forms the basis for the development of training packages, which will also be made available online.

In this way the BBRI is building up the capacities of the entire sector to meet the monumental challenge of energetic renovation.



A joint European study
**to meet the challenge of
energy renovation.**

'Living Labs': innovation serving renovation

The BBRI is coordinating the ERDF's 'Living Labs Brussels Retrofit' project. This project aims to promote the renovation of dwellings in Brussels by means of living labs. These are testing environments using real buildings that are being renovated in collaboration with construction professionals, owners and residents.

In these living labs, new technologies and processes developed in collaboration with construction professionals and knowledge institutions active in this field are directly applied to (energy) renovation. This is the ideal way to test and improve innovations in a final phase. Improvements gradually come about through practical experience and interaction with users. The ultimate result is a saleable product or implementation technique. The companies involved end up in this way with a validated technology or business model to convince the market on a large scale.

There are currently five such living lab projects under way, on themes such as third-party financing for collective housing, guidance models for new residents and energetic optimisation of historically valuable buildings. The BBRI is directly involved in the 'Modul'Air' and 'Prio-Climat' projects. 'Modul'Air' is dedicated to the application of prefabricated façade modules for energy renovation. 'PrioClimat', on the other hand, focuses on optimising ventilation strategies to improve the indoor climate of renovated dwellings.



Promoting innovative techniques and materials **in practice.**



The living lab projects were developed in 2019 and their concept was tested and refined. The innovation partnership applied to the 'Modul'Air' project is a new type of public tender. This concept links the innovation phase of research and development to the implementation phase of the renovation works. In this way, maximum use is made of the leverage that public contracts provide and of generating or allowing innovation to flow through.

This successful concept has also been noted by the European Commission, represented by Marianne Thyssen. The project was a finalist for the Regiostars Awards 2019 in the 'Building climate-resilient cities' category. The Regiostars are the European awards for the most innovative regional projects. The professional jury was persuaded by the experimental concept and the unique approach that was applied to tackle the challenges associated with renovations. Both were defined by the BBRI, in collaboration with Innoviris, *Confédération Construction Bruxelles-Capitale* and partner universities.

The various candidacies from the sector to participate in the project also showed that construction professionals find this an attractive formula.





Modern technologies
for the preservation of
old buildings.

The ‘Renovation and Heritage’ laboratory is going all-out for digitisation

Digitisation is important not just for new buildings. Older buildings also – and perhaps even especially – benefit from modern techniques.

The digital turnaround made by the ‘Renovation and Heritage’ laboratory in 2019 was the most important achievement of the year, according to responsible Michael de Bouw, “We’ve made great strides both inside and outside the laboratory thanks to all the knowledge we have acquired with regard to drones, photogrammetry, laser scanning and 3D printing.”

For example, the laboratory is involved in two important projects, one involving climate monitoring in heritage buildings and the other project consists of a series of measurements in our laboratory itself. “Monitoring the indoor and outdoor climate of inhabited heritage buildings revolves around questions such as: how are those buildings used when they are inhabited? How strongly do the temperatures fluctuate? And how do we map these fluctuations as efficiently as possible?”, explains de Bouw. “In order to investigate this, we can now make extensive use of permanent remote monitoring, which can be linked to digital 3D measurements. This allows us to make simulations with a high added value.”

In the laboratory itself, the Karsten pipe test for measuring the water absorption of certain façade materials was digitised and automated.

For de Bouw, another important achievement of the laboratory in 2019 was the know-how gained in the area of heritage and comfort: “Protected heritage often presents bottlenecks with regard to the current energy rules. How do we increase the energy performance and comfort of these structures without affecting their heritage value? In recent years we have acquired a lot of in-depth know-how in this field, which we have subsequently shared with restoration architects during a five-day course.”

The Standards Antenna 'Energy and indoor climate'

The Standards Antenna 'Energy and indoor climate' aims to support SMEs and to provide them with information on thermal insulation, air-tightness, heating, ventilation and flue gas outlets. This objective can only be achieved through cooperation with companies that keep us informed of their interests in the applicable regulations and of the difficulties they encounter with them. For example, in 2019 we assisted around 50 SMEs individually and with personal visits (and many more by telephone), we made our website more ergonomic and we took part as speakers in various information sessions and seminars.

From a more technical point of view, we focused on the review of important standards for boiler room design and for the calculation of heat losses in buildings. Working together with the professional federation for installers and with the sector (oil, gas and manufacturers of heating boilers, etc.) information sheets have been drawn up and calculation tools developed that contractors can access free of charge. We have also put together specific courses and training programmes that will be offered from 2020 onwards.

Finally, with the help of other BBRI divisions and the sector (installers, Belgian Buildings Agency, supervisory bodies, etc.), we have drawn up a Technical Information Note (TIN) aimed at making the installation standards for underfloor heating easier to understand. This document will be published in the course of 2020.



Simple tools for the benefit of SMEs in the construction sector.



The BBRI participates in the work of various associations related to construction and has even contributed in the establishment of some of them. Dedicated to a wide range of activities within the sector, these institutions aim to support companies as their continuous priority.

Vlaanderen Bouwt (Vlabo)

Vlabo vzw (www.vlaanderenbouwt.be) aims to build quality housing at affordable prices with an architecture that forms an enrichment in less evident places (e.g. in towns and city centres). Furthermore, it also strives for optimal technical quality, sustainability and town-planning coherence. Landowners – both public authorities and individuals – can call upon Vlabo as a project manager.

Organisatie voor Duurzame Energie (ODE Vlaanderen)

As a coordination body for sustainable energy in Flanders for 20 years, ODE (www.ode.be) ensures the dialogue between companies and organisations from the renewable energy sector and the public authorities through thematic platforms on: heat pumps, photovoltaics, biomass, wind energy, heat networks, etc. Within this context, the BBRI is involved in the integration of renewable energy systems in buildings and the transition to climate-neutral solutions.

Belgian Centre for Domotics and Immotics (BCDI)

BCDI (www.bcdi.be) describes itself as a study and information centre in the field of automation integrated into the residential environment/building automation. Themes such as personal assistance, smart cities and intelligent buildings are also part of the BCDI's area of expertise. In recent years, the centre has collaborated on various national and European research projects, as well as on various conferences, forums and workshops.

Belgian Construction Quality Society (BCQS)

BCQS (www.bcqs.be) trains and advises building professionals involved in a labelling and/or certification process (quality management (ISO 9001), safety (VCA and ISO 45001) and environment (ISO 14001)). Privileged partner of BCCA and Construction Quality, BCQS also supports companies that have signed up for the quality programmes set up by these two associations.

Belgian Construction Certification Association (BCCA)

BCCA (www.bcca.be) is one of the leading Belgian certification bodies in the construction sector and has, thanks to this status, an accreditation from the BELAC office. This non-profit making association has supported the collective 'Construction Quality' label for a number of years and regularly performs production controls within the context of the CE marking.

Tradecowall

The objective of this society is to look for solutions for the processing of inert waste and excavation soil from construction and demolition sites (www.tradecowall.be). In 2019, Tradecowall focused on the application of the new AGR (Walloon Government Decree) of 5 July 2018 on soil management and traceability. Tradecowall continued, together with the BBRI, a research project relating to the recovery of aerated concrete waste.

The BBRI's activities are guided by fifteen Technical Committees. While eleven of the Committees directly represent a construction trade and are composed primarily of contractors, the others focus on subjects of interest to several trades. In order to guarantee this bottom-up approach, each Committee defines the actions that will be carried out in the following year, via the work plans submitted to the Standing Committee of the BBRI for approval.

Rough Structure and General Contractors



Chairman: X. Braet

Members: K. Andries, J. Bosmans, L. Courard, G. De Schutter, P. De Vylder, J. Deceuster, F. Demeulemeester, R. Dhuyvetter, P. Dresse, T. Eeckhaut, B. Geentjens, E. Gelaes, P. Goetinck, J. Govaerts, P. Ibens, S. Kaye, F. Lederer, J. Maertens, B. Marynissen (†), K. Neutens, P. Piroton, H. Sauwens, M. Seculier, R. Van Acker, E. Vandewiele, A. Vermeyen, G. Xhonneux

Engineers-leaders: N. Huybrechts, B. Parmentier

Engineers TAC: V. Dieryck (since October), M. Ghislain, A. Van der Auwera

Heating and Climate Control



Chairman: D. Peytier

Members: P.-Y. Badot, K. Beenarts, M. Blondiau, L. Brees (since September), V. Cazier, L. Dedeyne, G. Diericx, G. Diricq (until September), G. Gronsfeld, E. Maertens, J. Mampaey, L. Mehaudens, J.-P. Minne, E. Motmans, C. Nonneman, J. Nouwynck, S. Palinckx, A. Palumbo, F. Santucci, M. Therer, O. Thibaut, G. Ticquet, K. Van Campenhout, K. Van Dingenen, E. Vandenbosch, B. Verstraete

Engineers-leaders: C. Delmotte, P. Van den Bossche

Engineers TAC: I. De Pot, V. Jadinon

Paintwork, Flexible Wall and Floor Coverings



Chairman: S. Magnee

Members: G. Baert, P. Carlier, A. Cassauwers (since December), F. Coveliers, T. De Jaegher, J. Debuf, O. Delvaux, B. Dethune, E. Fleurinck, A. Gulisano, R. Hermans, B. Klinkers, J.-P. Lempereur, J. Lerot, J.-C. Leroy, J.-L. Louis, A. Mertens, P. Noé, J. Philippart, M. Piron, I. Simonet, M. Van Den Branden, D. Van Kerckhove, D. Vanden Driessche, L. Vanreenterghem, L. Verhelst, T. Vrambout

Engineers-leaders: E. Cailleux, E. Nguyen

Engineers TAC: M. Ghislain, T. Rondou, H. Vercoutere (until September)

Hard Wall and Floor Coverings



Voorzitter: M. De Bes (†), P. Goegebeur (since April)

Members: T. Archambeau, R. Bagnies (since October), V. Baumard, M. Bauters (since October), T. Beernaert, H. Berth (since July), A.-M. Bonnet, B. Broekaert, D. Crombez (since July), P. De Kinder, G. De Smet (since March), J. De Smet, P. De Stobbeleir, E. Godderis, P. Goegebeur (until April), T. Hemelsoet, S. Hens (since March), P. Holderick (since October), M. Keulen, V. Lefort, G. Mahaux, M.-M. Mennens, N. Naert, G. Pardon, B. Roten, B. Royaux (since October), C. Van De Velde, D. Van Kerckhove, E. Van Rumst

Observers: C. Arnould, P. Holderick (until October), B. Vangeersdaele, T. Verstaen

Engineer-leader: T. Vangheel

Engineers TAC: L. Firket, J. Van den Bossche

Glazing



Chairman: A. Sanchez

Vice-chairman: J. Jacobs

Members: J.-P. Aubert, L. Bonnave (since December), A. Cassauwers (since December), D. Ceyskens, H. Ceyskens, G. De Landtsheer, L. Delvoie, D. Dequidt, J. Deviliers, P. Dresselaers, L. Dumont (until December), V. Goethals, T. Hens, T. Laurens, G. Martens, M. Martinez, A. Minne, P. Mistler, R. Nokerman, W. Reniers, F. Symoens, F. Triekels, B. Van De Putte, J. Verhaert, L. Verhaert

Engineer-leader: V. Detremmerie

Engineers TAC: F. Caluwaerts, R. Durvaux, L. Lassoie

Sealing Works



Chairman: R. Evens

Members: S. Baelen, F. Belin, D. Bellanger, H.-C. Boulanger, F. Coninx, J. Coumans, C. Coussens, K. Derde, M. Kersschot, P. Kerstenne, F. Louwers, B. Marynissen (†), H. Michot, J. Moens, R. Naert, E. Schomus, S. Terryn, G. Timmermans, A. Ulens, P. Van Acker (since September), L. Van Audenhaege, G. Van Dyck, D. Van Kerckhove, B. Verbeke (until March), M. Wagneur, K. Wienen

Engineers-leaders: E. Mahieu, E. Noirfalisse

Engineer TAC: D. De Bock

Roof Coverings



Chairman: C. Vandermosten

Members: U. Bal (since October), F.-X. Bocage (since October), A. Bountzouklis (since October), F. Cauwelier, S. Couez, J.-P. Crohin (since October), P. Crohin, S. Daelman, C. Degreef (since October), S. Depuis, G. Derde, P. Donner, Y.-M. Dron, M. Dubois D'Enghien, J.-F. Fontenoy (since October), B. Fournet (since October), R. Geens, D. Gouverneur (since October), J. Lemmens, M. Lesenfants, B. Rahier, C. Résimont, P. Segers, T. Stockman, C. Suarez (since October), A. Thierens, G. Timmermans, J.-M. Tong, J. Van Leeuwen, N. Vander Putten (since October), A. Vanhove, R. Vignix (since October), D. Wattel, L. Zanussi

Engineers-leaders: F. Dobbels, D. Langendries

Engineers TAC: D. De Bock, L. Geerts

Sanitary and Industrial Plumbing, Gas Installations



Chairman: P. Deweer

Members: K. Beenaerts, M. Blondiau, B. Claessens, M. Decat, G. Diericx, J.-P. Geerts, G. Gronsfeld, E. Maertens, L. Martin, J.-F. Minne, C. Nonneman, D. Peytier, M. Spector, G. Tiquet, M. Van Der Beken, C. Van Dinter, P. Van Rompaey, B. Verstraete, K. Wuyts

Engineers-leaders: B. Bleys, V. Jadinon

Engineer TAC: I. De Pot

Joinery



Chairman: W. Simoens

Members: J. Andries, G. Baens, D. De Both, J. De Bruijne, R. De Cort, R. De Schepper, C. Decaesstecker, J. Dehennin, P. Delcour, M. Foré, J. Geebelen, S. Kempeneers, L. Pype, P.-J. Simoens, G. Van De Walle, J. Van Hal, N. Van Hee, D. Van Kerckhove, F. Vanholst, M. Vanzurpele, A. Verbeke, J. Verniers, D. Versluys

Engineers-leaders: V. Detremmerie, E. Kinnaert, Y. Martin

Engineer TAC: F. Caluwaerts

Stone and Marble



Chairman: H. Vanderlinden

Members: J. Abraham, R. Baugnies, K. Callebaut, H. Callewier, J. P. Cnudde, V. Cnudde, A. Dath, M. De Bes (†), G. Denaeyer, P. Dethier, J. Elsen, A. Fontaine, P. Goegebeur, E. Latour, G. Legein, A. Matthys, M.-M. Mennens, B. Misonne, D. Pallix, S. Piedboeuf, S. Renier, T. Schotte, F. Tourneur, G. Van Gucht, K. Vandenneucker

Engineer-leader: D. Nicaise

Engineers TAC: L. Firket, J. Van den Bossche

Plastering, Jointing and Façade Work



Chairman: D. Verhaegen

Members: P. Beaujean, J. Beke, B. Broekaert, P. Cherchye, O. Cremer, F. Croonenberghs (until June), R. De Haes, P. De Kinder, J.-P. Demuynck, C. Denayer (since June), M. Dutry, E. Godderis, J. Govaerts, H. Hendriks, J.-Y. Huberty (since October), S. Jamar (since October), G. Mostenne, N. Naert, M. Oldyck (since October), J. Peeters, U. Peter (since October), S. Piedboeuf, J. Schalley, P. Timperman, D. Van Kerckhove, V. Verachten (since October), F. Verhelst (until October), G. Veys (since October)

Engineers-leaders: I. Dirckx, Y. Grégoire

Engineers TAC: S. Korte, M. Lignian

Building Physics, Comfort and Safety



Chairman: E. De Kempeneer

Vice-chairman: M. Ruebens

Engineers-leaders: L. De Geetere, X. Loncour, Y. Martin, J. Van der Veken

Engineers TAC: A. Acke, G. De Raed, S. Eeckhout, J. Goovaerts, M. Lignian

Hygrothermy



Chairman: A. Dawans (since September), E. De Kempeneer (until September)

Members: M. Bonnarens, A. Dawans (until September), E. De Kempeneer (since September), V. De Meulenaer, P. Deweer, L. Dumont, V. Feldheim, M. Frederic, H. Geeraerts, A. Gillard, A. Janssens, K. Ludwik, J. Lavens, J.-P. Minne, D. Peytier, I. Piette, B. Present, S. Roels, M. Ruebens, N. Spies, V. Szpirer, A. Van Eycken, D. Van Kerckove, C. Van Loock, E. van Overmeire (since March), R. Van Rossem, B. Vandermarcke, J.-P. Wintgens

Engineers-leaders: X. Loncour, J. Van der Veken

Engineer TAC: A. Acke

Acoustics



Chairman: E. De Kempeneer (until October), C. Decaesstecker (since October)

Members: S. Cassiman, J. Coose, R. De Block, C. Decaesstecker (until October), E. Degrave, P. Dresse, R. Dumont, H. Fabri, R. Geens, A. Gillard, F. Goes, A. G. Graceffa, C. Grimonpont, S. Hayen, B. Heymans, J.-P. Lahaye, J. Lavens, J. Marinus, K. Maroy, A. Minne, H. Mostmans, J. Nemerlin, G. Oushoorn, P. Roman, M. Ruebens, P. Toussaint, M. Van Damme, H. Van Keymeulen, C. Van Loock, E. Van Overmeire, P. Vandewiele, M. Vanstraelen, L. Vasseur, G. Vermeir, J.-F. Winant

Engineer-leader: L. De Geetere

Engineers TAC: J. Goovaerts, M. Lignian

Fire safety



Chairman: /

Members: B. Akkermans, M. Berckmoes, S. Cassiman, M. Colson, C. Decaesstecker, V. Detemmerman, R. Goovaerts, B. Heymans, G. Janssen, M. Leysen, E. Mackelbergh, J. Marinus, C. Pimpurniaux, M. Ruebens, B. Stockbroeckx, W. Van de Voorde, T. Van Helden, K. Van Herpe, N. Van Houten, C. Van Loock, A. Van Steelant, K. Vercaempt, J.-P. Veriter

Engineer-leaders: S. Eeckhout, Y. Martin

Engineers TAC: G. De Raed, J. Goovaerts

Architects



Chairman: J. Beke

Vice-chairmen: R. De Lathouwer, C. Bourgois

Members: J. Alboort, A. Boutemadja, G. Colliers, M. D'Anvers, D. De Clerck, P. De Smet, L. Dedeyne, S. Demon (since May), J.-C. Embrechts, E. Geens, E. Germijns, J. Glaude, T. Hermans, N. Huysmans, H. Krokaert, T. Lamy, P. Laporta, C. Lemmens, F. Luyckx, J. Mariën, T. Modave, S. Motte, H. Poncin, M. Proces, T. Serck, M. Vercruysse, D. Versluys, M. Wagneur

Engineers-leaders: S. Danschutter (since December), S. Eeckhout (until December), D. Langendries (until December), P. Wouters

BIM & ICT



Chairman: T. Vandenberg

Members: P. Abeel (since September), J. Alboort, A. Argeles, M. Baetens, K. Baggen, J.-P. Bauwens, X. Bindels, A. Bitar, S. Boeykens, A. Boutemadja, W. Bouttery, M. Brochier, W. Bulens, N. Calicchia, R. Collard, J.-P. Couwenbergh, F. Crovato, C. Dalhuizen, J. De Smedt (since March), F. Denis (until March), V. Detemmerman, L. Dewulf (until February), J. Dhondt, A. Dubuisson, G. Duyckaerts, G. Eeckhout (until February), D. Froyen, B. Geerinckx, G. Giroto (until February), T. Gretry, K. Grietens (since September), D. Hellemans (since September), P. Janssens (since February), G. Kerckhofs, R. Klein, J. Kuppens, S. Leenknecht (until February), P. Legros, J. Lhoëst, U. Linden, M. Loncke (until February), K. Luckx, N. Maes, V. Marbach, V. Martin, B. Marynissen (+) (until November), G. Mertens (until February), R. Meuleman, R.-H. Meurisse, M. Moens, E. Moeyersons, P. Moutschen, N. Nicolas (until March), J. Nolet (since May), T. Nuttens (since March), K. Nys, M. Oumzil, P. Pauwels, G. Pierrard, E. Piers, P.-B. Pousset, P. Present, A. Sagne, L. Schiltz (since February), F. Schwall, Y. Sottiaux, J.-M. Stiernon (since March), D. Stragier (until January), W. Tanghe, F. Van de Velde, A. Van den Borre, J. Van Den Driessche, P. Van Den Eynde, S. Van Der Have, J. Van Mol, E. Van Overmeire, E. Van Overwaele, J. Vandamme, B. Vande Kerckhove, E. Vanmechelen, M. Venturini (until February), S. Verhaert, M. Verhiel (since September), R. Voshol, T. Vyncke, A. Wouters

Engineers-leaders: N. Cauberg, M. Huerdo Fernandez

Engineers TAC: R. Durvaux, S. Vercauteren

Smart & Sustainable Constructions



Chairman: R. Van Boeckel

Members: K. Allacker, A. Argeles, P. Ballon, K. Beenaerts, J. Beneens, F. Blockx, M. Bonnarens, S. Breels, P. Callewaert, F. Cauwelier, T. Clerinx, M. Croufer, A. Dawans, M. De Bes (+), X. De Bueger, P. De Kinder, K. De Landsheere, G. De Landtsheer, G. De Schutter, N. De Temmerman, J. Declercq, V. Detemmerman (since September), A. Fuhr, B. Gentens, G. Goossens (since August), B. Huberlant, F. Jourdain, P.-H. Lefebvre, J. Lhoëst (since June), S. Magnee, M.-M. Mennens, J. Michiels, J. Moens, S. Motte, V. Naessens, K. Neyrinck (until July), D. Peytier, A. Poelman (until May), L. Schiltz (since February), W. Simoens, R. Smismans (until February), Y. Sottiaux, N. Stevens, M. Strobbe, F. Tourneur, S. Trachte, L. Van de Loock, K. Van Dingenen, G. Van Gucht, L. Van Thienen, S. Vande Meulebroucke, S. Vanden Brande, K. Vanderbruggen (since July), J.-C. Vanderhaegen, R. Vereecken, D. Verhaegen, B. Vuyge (since May), A. Windels (until May)

Engineers-leaders: R. Delvaeye, J. Vrijders

Engineers TAC: K. Janssens, S. Vercauteren

The accounts department aims to give a true picture of the financial situation of the Institute and justify the management decisions made.

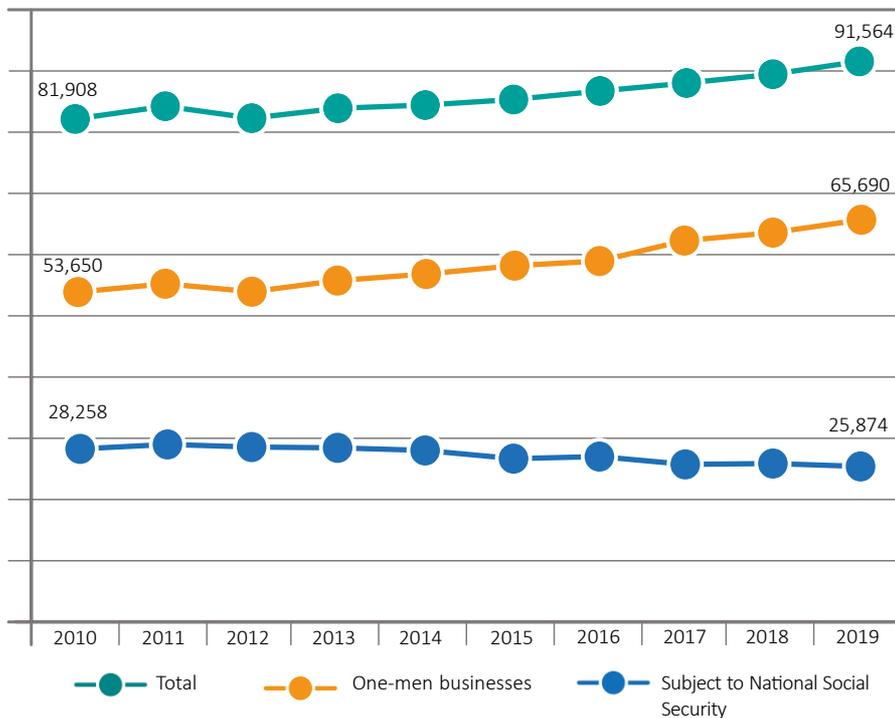
Affiliated members

On 31 December 2019, the BBRI had 91,564 members, including 65,690 one-man businesses. The graph below shows that this number has increased by 11.79 % over the past 10 years.

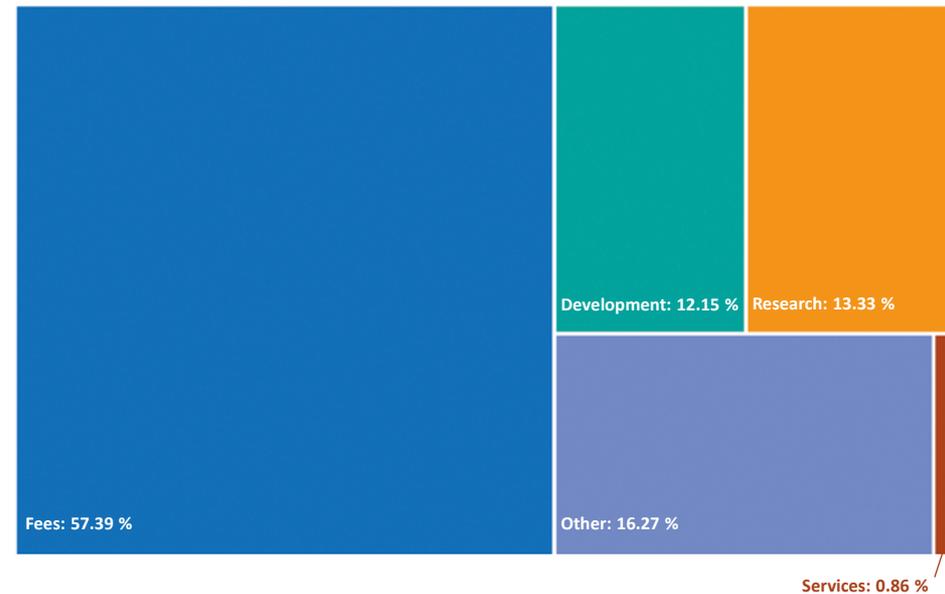
Operating revenues and expenditures

The graphs to the right illustrate the evolution of the different revenues and expenses in relation to the total. These show that the fees of the members represent on average some 57 % of the total revenue. Personnel costs – the largest item in the expenditures – amount to 63 % of the total.

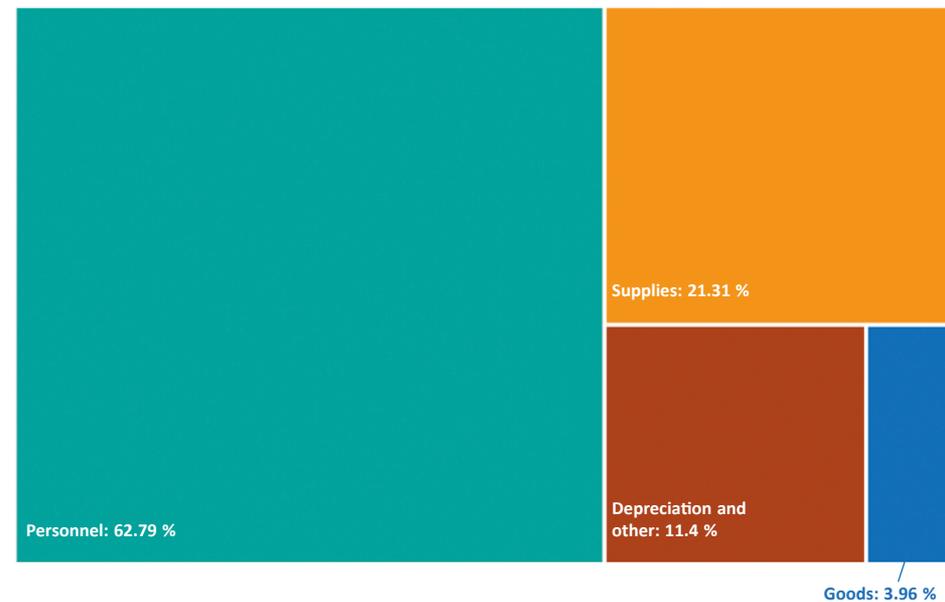
Evolution in the number of affiliates



Revenues



Expenses

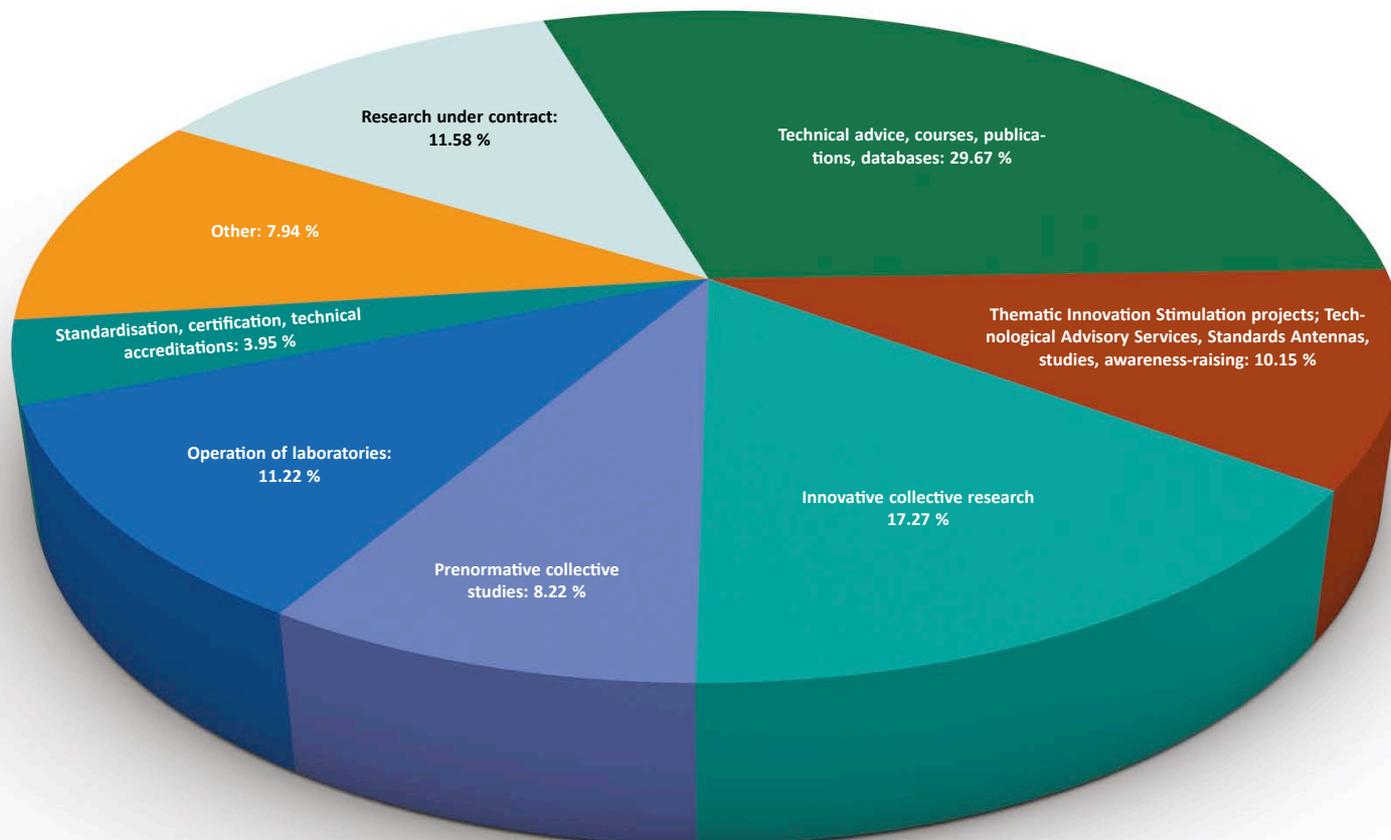


Destination of expenditures

The graph below shows the revenues and expenditures which result from the activities of the BBRI, after distribution of the structural costs. The latter represent not only the costs relating to the buildings and equipment, but also the administrative costs. This illustrates that all available resources benefit, directly or indirectly, construction companies.

Indeed, while 88 % of the total budget is directly invested for the benefit of the sector, 12 % of that is used for research activities under contract that, in the long run, will also benefit construction. Consequently, all our resources are devoted to improving the quality and competitiveness of the sector, which is ultimately the founding mission of the Institute.

Destination of expenditures



The BBRI can count on the expertise of nearly 260 employees from various disciplines to successfully carry out its mission. This synergy of professional skills, commitment and versatility contributes to making the Institute the authoritative body that it has become for the sector.

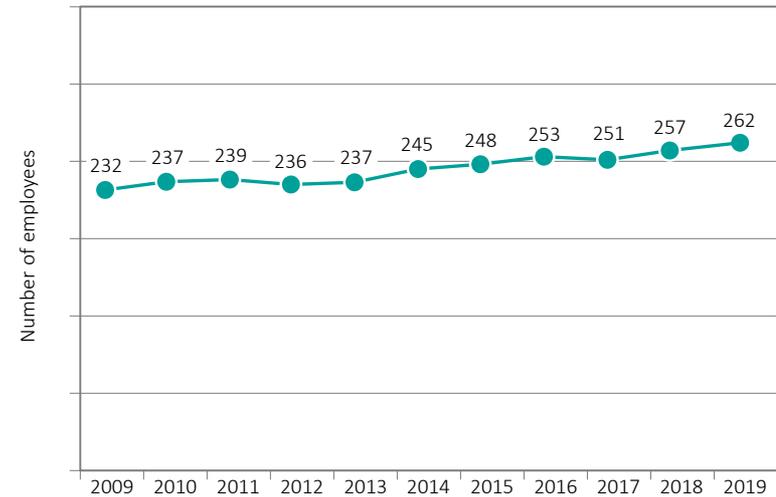
The BBRI makes great efforts to improve quality in construction and to strengthen the skills of professionals in the sector. This task is far from easy, given the fragmentation of the building process and the diversity of the partners involved.

To accomplish its mission and to anticipate technological evolutions, the BBRI relies on a dynamic and multidisciplinary team. Our personnel ensure that the fruits of scientific and technical research conducted by the Institute are used to benefit building contractors, as well as other professionals (architects, consultancy offices, chartered surveyors, education, administrations etc.).

The experience and pragmatism of some staff members combined with the innovative vision of others, make it possible to publish practical reference works, provide customized technical advice, and even courses and training sessions corresponding to the actual needs of the industry.

Given the growing complexity of these needs and the increased interest in areas such as sustainable and smart construction, industrialisation and BIM & ICT, a further increase in personnel numbers is expected in the coming years.

**Evolution of the workforce during the period 2009-2019
(situation as at 31 December)**



During the meetings of the General Council of the BBRI on 30 April 2019 and 26 November 2019, the composition of the General Council and the Standing Committee was approved as follows:

General Council

Chairman

J. Willemen

Vice-Chairmen

P. Depreter, E. Devos, C. Golinvaux

Honorary chairmen

J. Gheysens, R. Lenaers

Honorary Director General

J. Venstermans

Members appointed by the Confédération Construction

J. Biesmans, P. Crohin, R. de Mûelenaere, P. De Roover, J. Devilers, R. Evens, B. Geentjens, B. Georges, A. Graceffa, R. Hinnens, S. Jamar, S. Kaye, J. Lembrechts, E. Leskens, C. Macors, C. Maes, S. Magnée, G. Mahaux, B. Marcin, O. Mareschal, L. Mohymont, J. Polet, M. Ruebens, B. Schrevens, M. Schwanen, P. Segers, W. Simoens, D. Snick, W. Straetmans, B. Tasiaux, M. Therer, H. Vanderlinden, E. Vandewiele

Members coopted by the Confédération Construction

N. De Smet, E. Devos, C. Hautier, B. Heiderscheidt, D. Holemans, C. Peeters

Members appointed by the Bouwunie

G. Baert, J. Debuf, B. De Malsche, D. Hellemans, P. Suys, L.-J. Vancauwenberghe, S. Verhoeven, F. Verkest, J.-P. Waeytens

Standing Committee

Chairman

J. Willemen

Vice-Chairmen

P. Depreter, E. Devos, C. Golinvaux

Members

J. Biesmans, R. Collette, R. de Mûelenaere, G. De Vlamincq, J. Lembrechts, L. Mohymont, M. Ruebens, E. Vandewiele, F. Verkest, J.-P. Waeytens

Observers

A. Gillin, L. Van de Look

Member appointed by the FEB

C. Golinvaux

Members appointed by the Federal Public Service Economy

R. Collette, G. Jansens

Members appointed by the Flemish Region

S. Faignet, L. Van de Look

Members appointed by the Brussels-Capital Region

O. Eugene

Member appointed by the Walloon Region

A. Gillin

Members appointed by the workers' organisations

P. Cuppens, G. De Vlamincq, B. Hilami, J.-L. Teheux, J. Vandycke

Auditors

J. Lembrechts, B. Tasiaux

Company auditor

HLB Dodémont-Van Impe



Give Me Five

A-LIGHT II – Integrating lightweight concepts in acoustical standardization (FPS Economy and NBN)

ADERSOL – *Critères d'adhérence pour revêtements de sol* (Adhesion criteria for floor coverings) (FPS Economy and NBN)

AGGLOSTO – *Pierre agglomérée : vers un cadre normatif adapté pour l'utilisation de la pierre agglomérée dans le bâtiment* (Agglomerated stone: towards an adapted normative framework for the use of agglomerated stone in buildings) (FPS Economy and NBN)

AN Acoustique (SA Acoustics) (FPS Economy and NBN)

AN Béton-mortier-granulats (SA Concrete-mortar-aggregates) (FPS Economy and NBN)

AN Détails constructifs (Smart Connect) (SA Construction details) (FPS Economy and NBN)

AN Eau & Toitures (SA Water & Roofs) (FPS Economy and NBN)

AN Eclairage (SA Lighting) (FPS Economy and NBN)

AN Eléments de façades manuels et motorisés (SA Manual and motorized façade elements) (FPS Economy and NBN)

AN Energie et climat intérieur (SA Energy and indoor climate) (FPS Economy and NBN)

AN Eurocodes (SA Eurocodes) (FPS Economy and NBN)

AN Géotechnique (SA Geotechnics) (FPS Economy and NBN)

AN Parachèvement (SA Finishing) (FPS Economy and NBN)

AN Prévention du feu (SA Fire prevention) (FPS Economy and NBN)

AN Qualité de l'air intérieur (SA Indoor air quality) (FPS Economy and NBN)

AN Tolérances et aspect (Eye Precision) (SA Tolerances and appearance) (FPS Economy and NBN)

ATISOLC2C – *Système constructif comportant une membrane biosourcée pare-vapeur et d'étanchéité à l'air couplée à une isolation pour les bâtiments neufs à ossature en bois et pour la rénovation par l'intérieur, en suivant la démarche Cradle to Cradle* (Bio-based vapour barrier and airtight membrane construction system paired with insulation for new wood-

frame structures and interior renovation, following the Cradle to Cradle initiative) (Greenwin - Wallonia)

AUTODRONE – *Geautomatiseerde Inspectie van Infrastructuur aan de hand van Drones* (Automated Inspection of Infrastructures using Drones) (VLAIO - Flanders)

B-LCA II – *Cadre méthodologique pour la réalisation de LCA dans la construction. Modélisation belge et ajustement du cadre européen* (Methodology framework for the execution of LCA in the construction sector. Belgian modelling and further development of the European framework) (FPS Economy and NBN)

BBSM – *Le Bâti bruxellois : source de nouveaux matériaux* (Brussels' buildings: a source of new materials) (ERDF - Brussels)

BCCC – Brussels Construction Consolidation Centre (Innoviris Brussels)

BE REEL! – Belgium Renovates for Energy Efficient Living (EU LIFE - European Union)

BIM 4.2 (VLAIO Flanders)

BIM MENUISERIES – *Outil intégré BIM-compatible sur les exigences des menuiseries extérieures et les performances des châssis en bois* (Integrated BIM compatible tool for the requirements of outdoor joinery and the performances of wooden frames) (BBRI)

BIM4SUB – *Développement d'une interface de collaboration basée sur l'open BIM en vue d'optimiser la collaboration avec la sous-traitance* (Development of a cooperation interface based on open BIM with the aim of optimising cooperation with subcontractors) (DG06 - Wallonia)

BIMy – BIM in the city (Innoviris - Brussels)

BIO-CLAY-MASONRY – *Cadre normatif pour l'argile non cuite et les produits de maçonnerie biosourcés* (Normative framework for unbaked clay and bio-based masonry products) (FPS Economy and NBN)

BlocIso – *Blocs constructifs isolants en pied de mur; performances mécaniques de maçonneries 'composites'* (Isolating building blocks at the base of walls: mechanical performances of composite masonry) (BBRI and BCCA)

Bouw hubs – *Logistiek in de bouw* (Logistics in construction) (VIL and VLAIO - Flanders)

BruGeo – *Valorisation du potentiel géothermique de la Région Bruxelles-Capitale* (Exploiting the geothermal potential of the Brussels-Capital Region) (ERDF - Brussels)

Build4Wal – *Démonstrateur Construction 4.0* (Demonstrator Construction 4.0) (Digital Wallonia and DG06 - Wallonia)

C-Bridge – *Stappenplan naar ontwerp, regelgeving en constructie van composietbruggen in Vlaanderen* (Step-by-step plan for the design, regulation and construction of composite bridges in Flanders) (VLAIO - Flanders)

CBCI – Circular Bio-based Construction Industry (Interreg - Europe)

Centrum Bouw 4.0 (ERDF - Flanders)

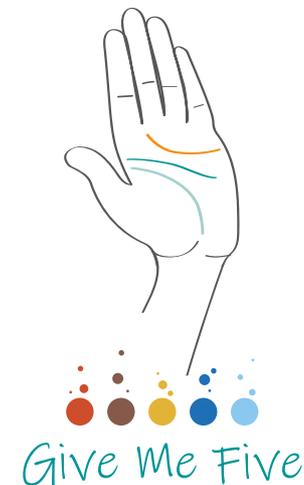
Changing minds – *Op weg naar levenslang zorgeloos wonen. Het kruispunt tussen bouw en zorg* (Towards life-long carefree dwellings. Where construction and people care meet) (VLAIO - Flanders)

Circulaire school van de toekomst (Circular Purchasing Flanders)

Circular.Concrete – *Beton meer circulair maken* (Making concrete more circular) (SIM Flanders and VLAIO - Flanders)

Clean.ETICS – *Guide pour le nettoyage des ETICS* (Guide for the cleaning of ETICS) (BBRI and BCCA)

CLEARPOWER – *Coatings pour le stockage d'énergie issue de productions renouvelables* (Coatings for energy storage from renewable resources) (ERDF - Wallonia)



Cluster BIM (VLAIO- Flanders)

CODEC II – Communication framework for digital construction (FPS Economy and NBN)

CoDyNiII – *Détermination in situ des performances énergétiques réelles des bâtiments à l'aide de tests de coheating dynamiques et de mesures non intrusives II* (On-site determination of the real energy performances of buildings using dynamic co-heating tests and non-intrusive measuring II) (FPS Economy and NBN)

COMISVENT – *Evaluation des performances des systèmes de VENTilation en phase de CONception, et de MISE en service* (Evaluation of the performances of ventilation systems in the design and commissioning phase) (FPS Economy and NBN)

ConCure – *Mise au point d'une méthode et de critères robustes pour déterminer l'efficacité des produits de cure* (Development of a robust method and criteria to determine the efficiency of curing products) (FPS Economy and NBN)

Construire adaptable (DG04- Wallonia)

CORROSION-ZINC-TOITURE-CHAUDE – *Cas de corrosion des complexes non aérés avec un revêtement en zinc protégé par un coating en sous-face* (Corrosion of non-ventilated complexes with a zinc covering protected by a zinc coating on the bottom side) (BBRI)

CRAMIC – Crane Dynamics (DG06- Wallonia)

CSiteVision – *Virtual en augmented reality in de voorbereidingsfase en de uitvoeringsfase* (Virtual and augmented reality in the preparation phase and the execution phase) (VLAIO- Flanders)

Déchets de construction Bruxelles – *Chantiers pilotes pour la Gestion des Déchets de construction à Bruxelles* (Pilot project for the management of construction waste, in Brussels) (Bruxelles Environnement- Brussels)

DeepCrete – *Réalisation de parois coulées : spécification du béton et contrôle de la qualité* (Execution of cast walls: concrete specifications and quality control) (FPS Economy and NBN)

DeltaT – *Dispositif d'autoalimentation électrique d'installations thermiques par effet thermoélectrique* (Electrical self-supply system for thermal installations using thermo-electric effect) (Innoviris- Brussels)

DigiPLACE – Digital Platform for Construction in Europe

(H2020- Europe)

DigitalDeConstruction – Advanced Digital Solutions Supporting Reuse and High-Quality Recycling of Building Materials (Interreg- Europe)

Drones – *Drones als hulpinstrument op de werf* (Drones as on-site tools) (VLAIO- Flanders)

Duurzaam Betonherstel – *Nieuwe technologieën, producten en inzichten voor een duurzame herstelling van betonstructuren* (New technologies, products and insights to sustainably repair concrete structures) (VLAIO- Flanders)

EcoCities – *Groenwanden en -daken als bron voor ecosysteemdiensten in onze toekomstige steden* (Green walls and roofs as a source for ecosystem services in our future cities) (FWO- Flanders)

Entretien menuiseries – *Entretien des finitions des menuiseries extérieures en bois* (Maintenance of the finishing of wooden outdoor joinery) (FPS Economy and NBN)

ETICSiv – *Doorgedreven implementatie van innovaties binnen ETICS met harde bekledingen* (Extensive implementation of innovations for ETICS with hard coverings) (VLAIO- Flanders)

Evacode II – *Méthode d'évaluation des performances des appareils de conditionnement d'eau destinés à prévenir la formation de tartre* (Evaluation method to prevent limescale formation in water treatment installations) (FPS Economy and NBN)

FCRBE – Facilitating the circulation of reclaimed building elements in Northwestern Europe (Interreg- Europe)

FiSaF – Fire Safety of multi-storey building façades (with combustible materials) (FPS Economy and NBN)

GABI – European network for shallow Geothermal energy Applications in Buildings and Infrastructures (COST- European Union)

GEOCONSTRUCT II – *Etat limite de service de structures géotechniques : Méthodes de déduction des paramètres de déformation du sol, de calcul des déformations de structures géotechniques et directives relatives aux déformations admissibles* (Service limit state of geotechnical structures: Methods for the deduction of soil deformation parameters, the calculation of the deformations of geotechnical structures and directives on admissible deformations) (FPS Economy and NBN)

Glazen borstweringen: herevaluatie (BBRI and BCCA)

GRANISEC – *Méthodologie pour l'évaluation de l'aptitude à l'emploi des granulats inertes secondaires dans le béton* (Methodology for evaluating the suitability of secondary inert granulates for use in concrete) (FPS Economy and NBN)

Groen bouwen – *Groene gevels voor duurzame gebouwen en steden* (Green construction – Green façades for sustainable buildings and cities) (VLAIO- Flanders)

Groen Licht Vlaanderen – *Samenwerken rond digitalisering van verlichting* (Collaboration on the digitisation of lighting) (Cluster of IBN- Flanders)

Guidance technologique Ecoconstruction et développement durable en Région de Bruxelles-Capitale (Innoviris- Brussels)

HAMSTER – Heat, Air and Moisture real scale. Test facility for building elements (ERDF and Innoviris- Brussels)

Hygrimpact – *Impact des caractéristiques hygrothermiques des matériaux sur la performance thermique et le confort des bâtiments* (Impact of hygrothermal properties of materials on the thermal performance and the comfort of buildings) (FPS Economy and NBN)

In-Vent-Out II – *Positionnement relatif des ouvertures d'amenée d'air par rapport aux évacuations d'air et de fumée des bâtiments* (Relative positioning of air supply openings in relation to the air and flue gas openings of buildings) (FPS Economy and NBN)

IN2EUROBUILD – *Directives pour l'isolation intérieure des bâtiments existants* (Directives for the internal insulation of existing buildings) (Cornet- Wallonia and Europe)

Intellicht – *Intelligente lichtregelsystemen* (Intelligent lighting control systems) (VLAIO- Flanders)

KalkHennep_VL – *Ontwikkeling van ontwerp- en uitvoeringsondersteuning voor de toepassing van kalkhennep in de Vlaamse bouwsector* (Development of design and execution support for the application of hemp lime in the Flemish construction sector) (VLAIO- Flanders)

Kwalitatieve warmtenetten (VLAIO- Flanders)

Label Circulair Gebouw (OVAM and Vlaanderen Circulair - Flanders)

LCCECOTOOP – *Life Cycle Costs als economische succesfactor* (Life Cycle Costs as a factor of economic success) (VLAIO- Flanders)

Living Labs Brussels Retrofit (ERDF and Innoviris- Brussels)

Material World – *Sensorische ervaring en duurzaamheid als strategie bij materiaalkeuzes voor winkelinterieur* (Sensory experience and sustainability as a strategy when selecting materials for commercial interiors) (VLAIO- Flanders)

Modul'Air – *Module de façade préfabriqués pour la rénovation accélérée de l'enveloppe et des systèmes de ventilation* (Prefabricated façade module for a faster renovation of the building envelope and the ventilation systems) (ERDF and Innoviris- Brussels)

NEPBC – Next generation building energy assessment methods towards a carbon neutral building stock (FWO- Flanders)

Off-Site Construction en Bouwindustrialisatie (Cluster of IBN- Flanders)

Onderhoudsplanung 4.0 (VLAIO- Flanders)

Ondes électromagnétiques. Atténuation dans les bâtiments (BBRI)

Out2In – *Impact des techniques de filtration et de purification de l'air sur la pénétration des polluants de l'air extérieur par ventilation pour améliorer la qualité de l'air intérieur dans les bâtiments durables* (Impact of filtration and air purification techniques on the penetration of outdoor air pollutants via ventilation to improve the indoor air quality in sustainable buildings) (Innoviris- Brussels)

P-RENEWAL – *Renovation énergétique du bâti wallon d'avant-guerre à valeur patrimoniale* (Energy renovation of prewar Walloon heritage buildings) (DG04- Wallonia)



PEPSE – *Conception, développement, validation et mise en service d'un poste d'essai semi-virtuel pour le test de systèmes de production, de stockage et de distribution d'énergie* (Design, development, validation and commissioning of a semi-virtual test station for the testing of energy production, storage and distribution systems) (ERDF- Wallonia)

Prio-Climat – *Priorisation et optimisation des stratégies de rénovation dans le logement social : vers un meilleur climat intérieur* (Prioritisation and optimisation of renovation strategies in social housing: towards a better indoor climate) (ERDF and Innoviris- Brussels)

ProReMat – Procurement of Reused & Recycled Materials (Circulair Aankopen- Flanders)

RETROFIT – *Développement de solutions innovantes pour la rénovation des fenêtres. Cas du retrofit (remplacement du vitrage seul) par un nouveau vitrage sous-vide super isolant* (Development of innovative solutions for the renovation of windows. Retrofit (replacement of the glazing only) with new super-insulating vacuum glazing) (DG06- Wallonia)

Revêtement chape – *Pose des revêtements de sols résilients : maîtrise de l'humidité des chapes* (Execution of resilient floor coverings: moisture control in screeds) (FPS Economy and NBN)

Rinçage des conduits d'eau potable (BBRI and BCCA)

Sand2Sand – *Hoogwaardige toepassingen voor gerecycleerde zanden in beton* (High-quality applications for recycled sands in concrete) (MIP and VLAIO- Flanders)

SB45C – Smart Buildings for Smart Cities (BBRI)

SCoolS – Sustainable Cooling Systems (Cornet project, European collaboration supported via VLAIO)

Silencevent – *Voorspelbare stromingsakoestische prestaties van ventilatiesystemen in woongebouwen* (Expected acoustic-flow performances of ventilation systems in residential buildings) (VLAIO- Flanders)

Silenthalpic – *Ventilation décentralisée silencieuse et intelligente avec récupération de chaleur sensible et latente* (Silent and intelligent decentralised ventilation with sensible and latent heat recovery) (DG06 – Wallonia)

SMART AGE-FRIENDLY HOUSING (BBRI)

Smart Buildings in Use (Cluster of IBN – Flanders)

SmartPower – *Capacité correcte pour le chauffage des bâtiments* (Correct capacity for the heating of buildings) (FPS Economy and NBN)

SoilmixWal – *Développement d'un nouveau procédé soilmix dédié à de nouvelles applications géotechniques durables, rentables et respectueuses de l'environnement* (Development of a new soil mix process for new, sustainable, profitable and environmentally friendly geotechnical applications) (SPW – Wallonia)

SOL-isPUR – *Cadre normatif et critères d'utilisation pour isolation de PUR projeté sous chape* (Normative framework and criteria of use for sprayed PUR insulation under screeds) (FPS Economy and NBN)

SOLREN – *Remblais renforcés* (Reinforced embankments) (FPS Economy and NBN)

STEPWiSe II – Safety of Temporary Works (FPS Economy and NBN)

STOCC – *Stockage de chaleur et par matériaux à changement de phase* (Chemical and phase-change heat storage) (EFRO- Wallonia)

TASSEMENT CELLULOSE – *Tassement des isolants insufflés et en vrac* (Subsidence of blown-in and loose insulation) (BBRI)

TERASSE EN BOIS (BBRI)

Uitbreiding geothermische screeningtool (BBRI)

VENT TOITURES – *Résistance au vent des toitures. Evaluation en labo et in situ* (Wind resistance of roofs. Laboratory and on-site evaluation) (BBRI and BCCA)

VENTURESIII – *ETICS avec revêtements durs : thèmes spécifiques* (ETICS and hard coverings: specific themes) (BBRI and BCCA)

Vezelversterkte dekvloeren (BBRI and BCCA)

Vlaams Kennisplatform Woningrenovatie (VLAIO- Flanders)

Wash II – *Constructions étanches : vers des exécutions efficaces et robustes* (Impermeable constructions: achieving efficient and robust executions) (FPS Economy and NBN)

LIST OF PROJECTS IN 2019

In order to meet the requirements of the sector, the BBRI collaborates on various research projects and awareness initiatives. These projects are supported by the following bodies:



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Researches • Develops • Informs

Primarily financed through the membership fees of some 95,000 Belgian companies, representing almost all of the construction trades, the BBRI has been considered the leading scientific and technical institute for over 55 years, contributing directly to the improvement of quality and productivity.

Research and Innovation

The introduction of innovative techniques is vital for the survival of an industry. Oriented by the construction professionals, contractors and experts sitting on the Technical Committees, the Institutes' research activities are closely aligned to the day-to-day needs of the sector.

With the help of various official bodies, the BBRI encourages companies to innovate, by offering advice in various fields that is tailored to the current challenges.

Development, standardisation, certification and approval

At the request of public or private players, the BBRI also works on various development projects under contract. Actively collaborating in the activities of the standardisation institutes – on the national (NBN), European (CEN) and international (ISO) levels – as well as in those of bodies such as the Belgian Union for Technical Approval in Construction (UBAAtc), the Institute is ideally placed to gain insight into the construction sector, and thus to better respond to the future needs of the various construction trades.

Dissemination of knowledge and support to companies

The BBRI makes extensive use of information technology in order to efficiently share the results of its work with all companies of the sector. Its website, adapted to the diverse needs of construction professionals, contains the publications of the Institute as well as more than 1,000 construction standards.

Personalised training and technical assistance contribute to the Institute's commitment to disseminating information. Alongside some 750 information sessions and thematic conferences involving the BBRI's engineers, over 18,000 advice notices are issued each year by the Technical Advice Division.

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