CONTENTS

The BBRI : firmly anchored in history and resolutely turned towards the future 3

Events 4

Research – Development – Information 5

Introduction 5
Geotechnics & Structures 6
Concrete & Concrete Structures 8
Masonry & Facades 10
Roofs & Light Structures 12
Joinery & Glazing 14
Wall and Floor Finishing 16
Sustainable Construction & Renovation 18
Energy, Indoor Climate & Installations 20
Acoustical Comfort 24
Management, Quality & Information Technologies 26
European Construction 27

Technical Assistance 28

Associations of the BBRI 29

Technical Committees 30

Personnel 33

Finances 34

Statutory Bodies 36

Annex – Online ‘Projects’ Database 37

Management and Staff 40
The BBRI: firmly anchored in history and resolutely turned towards the future

2009 was a key year for the BBRI. It was the year we celebrated the first half century of existence of the Institute, whose vital mission and expertise were recalled by Herman Van Rompuy, then Prime Minister of Belgium and today President of the Council of Europe: ‘People tend to underestimate how much this institute means for society, but I will seize any opportunity that arises to give it my support.’ Indeed, when all eyes turn to our sector in search of answers to the many social, economic and environmental challenges of our century, it is more important than ever to innovate while remaining close to the realities in the field. Thanks to the close relationship that it maintains with the latter via the Technical Committees, the Institute intends to make its contribution by helping the sector bring itself into line with the necessary sustainable development of society.

With regard to thermal insulation of existing buildings, the sector’s expertise must be further reinforced by means of targeted and applied research. In the short term, we will enrich the offer of information in order to assist professionals to acquire skills enabling them to successfully design and work with the most recent materials and techniques. In the longer term, the BBRI is striving to become one of the pioneers in defining the ‘zero-net’ building of tomorrow, and to do so wishes to become actively involved in developing ambitious projects aimed at reducing the overall environmental impact of structures as much as possible.

At a time when a company’s competitiveness has never been more closely linked to its survival, the integration of ICT – information and communication technologies – is still spreading only slowly. And yet this is a condition sine qua non both for optimising the construction process and for the regulation of buildings. On the basis of this conviction, the Institute will be intensifying the various research and information projects on the subject. It will also organise a roadshow to promote its Internet site, the richness of whose offerings is still too little-known. Besides the 1,200 standards placed online in 2009, new digital tools will be developed, with special attention devoted to the aforementioned themes.

There can be no doubt that the sector’s future will be forged in research, innovation and in the actions taken to inform and educate its participants. Firmly anchored in history and resolutely turned towards the future, the BBRI is today more than ever the Reference Institute for building our future.

In 2009, the year celebrating the first half century of the BBRI’s existence, the Institute kept its eyes set on the future, with always the same priority: improving the quality of structures and the competitiveness of the sector’s professionals.
2009 was the year we celebrated the first half century of the BBRI’s existence, 50 years which enabled the Institute to amass a solid expertise and become a genuine centre of knowledge at the service of construction, firmly anchored in history and endowed with a clear vision of the future.

March 2009: The Reference Today for Building Tomorrow

On 20 March 2009, all of the persons actively involved in the functioning of the BBRI gathered in the Auditorium 2000, in Brussels, to celebrate its 50th anniversary in the presence of Mr Herman Van Rompuy, who was Belgium’s Prime Minister at that time.

Whether we are talking about solutions to environmental, social or economic problems, it is in research and innovation that the future will be forged. And, as Herman Van Rompuy recalled, the future is already tomorrow, a fortiori in a crisis period. It is indeed under such circumstances that it is essential to invest in innovation, particularly in a sector so closely linked to the economy and to the well-being of citizens.

April 2009: Jacques Gheysens, New Chairman of the BBRI

During the General Council of 28 April 2009, Jacques Gheysens was appointed as the new chairman of the BBRI. A structural civil engineer by training, he has served as president of the Walloon Construction Confederation and currently chairs the board of directors of two building companies. He is determined to continue leading the BBRI into the 21st century, together with the management and with the support of the Standing Committee and the General Council. Jacques Gheysens promised that he would do everything in his power so that the Institute continues to invest for the benefit of its members and the entire sector.

He also congratulated outgoing chairman Rob Lenaers for the excellent management during the nine years of his mandate. The latter said that he could look back on those years with pride: each of the major lines of his policy memorandum had been implemented. Rob Lenaers also transmitted to his successor the following message: ‘Encourage and respect the insatiable aspiration for innovation, creativity and the obstinate perseverance which so profoundly characterise the highly-motivated BBRI staff’.

May 2009: Standards are Just a Click Away on the BBRI Internet Site

Nearly 1,200 standards useful for professionals of the sector can henceforth be downloaded from the Internet site. Because these documents are regarded as being state-of-the-art or best practices within the framework of the ten-year life-ability of project designers and contractors, the construction sector is the first beneficiary of this enrichment of the electronic information offered by the BBRI.

August 2009: Jan Venstermans, New General Director of the BBRI

After 23 years at the head of the BBRI, Carlo De Pauw set down his functions for a well-deserved retirement, turning over the helm to Jan Venstermans, who succeeded him effective 1 August 2009.

A structural civil engineer by training, Jan Venstermans has held various positions at the BBRI, including that of research director and Deputy General Director. He laid the bases for the modernisation of research on materials (electron microscopy, thin sections, etc.), played an essential role in the creation of ECCREDI (European Council for Construction Research, Development and Innovation) and coordinated a European working group on e-construction designed to encourage the dissemination of informatics in the European construction sector.

Responsible for ICT at the BBRI, he then focused on modernising the computer network of the Institute, which today makes it possible to transfer knowledge to member companies (24 hours a day). He also played a major role in drafting the ‘Moerman-Reynders’ measure introducing a substantial reduction of the withholding tax on the salaries of researchers.
The present Report highlights the main trends of the year 2009 and the role played in them by the BBRI. However, the many projects it carried out are only briefly summarised here, so that readers who are particularly interested in one or another of them are invited to consult the ‘Projects’ database which has been put online on the Internet site (www.cstc.be).

To enable efficient searching for the desired information, an overview of this database is presented in an annex.

**STANDARDISATION, CERTIFICATION AND APPROVAL**

Via the activities of its Standards Antennas (subsidiary by the FPS Economy), the BBRI strives to support Belgian companies (and especially the SMEs) by helping them find their way amidst the complex thicket of standards and regulations.

Seeking to guarantee the visibility of the activities and open the process of standardisation to all interested parties, the new philosophy introduced in recent years in the Belgian normative landscape is based on a decentralisation of standardisation activities.

As a technical reference centre for the sector, the BBRI is today recognised as the sectoral operator for more than twenty committees (some in collaboration with other organisations) responsible for developing draft standards and ensuring their follow-up.

**COLLECTIVE RESEARCH AND DEVELOPMENT**

While everyone recognises the vital character of innovative techniques for construction companies, it is also accepted that the multiplicity of actors and the fragmentation of the construction process make this task particularly difficult. This very complexity constitutes one of the reasons for the BBRI’s very existence.

The scientific and technical research carried out by the Institute is oriented by its Technical Committees, who make sure that the themes discussed are tuned to the needs of its members and of society in general.

For this purpose, the BBRI can rely on an extensive infrastructure and qualified laboratories. Among the tests conducted by the latter, seventy have been accredited by the BELAC office of the FPS Economy.

**INFORMATION, TRAINING AND SUPPORT FOR INNOVATION**

In a constantly developing world, companies must become ever more efficient, and to do so, they dispose of ever more sophisticated management and communication tools.

Bearer of responses to most of the challenges of our century, the act of building or renovating requires an increased technicity on the part of professionals who need to continuously improve their methods.

Hosting since 2009 the 1,200 standards which are most useful for the sector and this alongside all of the Institute’s other publications which are already online, the BBRI Internet site logically constitutes an information platform which is consulted more frequently every day, with nearly 1,200,000 sessions in 2009 and some 2,000,000 queries of the online technico-commercial database.

The information communicated via publications and the Internet site is supplemented by direct training of professionals from the sector.

During 2009, the staff of the BBRI gave no fewer than 600 courses and lectures, nearly 250 of which dealt with activities relating to company management (calculation of cost prices, planning techniques, etc.).

Parallel to the assistance provided to sector professionals by the engineers of the ‘Technical Advice and Consultancy’ department (see p. 28), the Technological Advisory Services and the Thematic Innovation Stimulation (TIS) projects contribute more directly to encouraging the development of innovative processes on the worksite.

Innovation is an essential factor for the survival of every sector. The construction sector is fortunate to be able to rely on the BBRI’s support to help it along this path.
Research – Development – Information
Geotechnics & Structures

Implementation of Eurocode 7, new methods for creating foundations, multi-floor construction with wood structures, mixed structures, ultra-high performance concretes, electronics in support of ‘intelligent’ construction: these were just a few of the favourite themes studied in 2009 by the BBRI with regard to geotechnics and structures.

The stability and resistance of structures are areas in which considerable efforts are made in order to enable faster processing, render systems more reliable, increase their resistance, give them related properties making them ‘intelligent’, but also to improve their energy performances within a context of sustainable development.

Moreover, the networked activities within various Belgian and European associations – the GBMS (Groupement belge de mécanique des sols et de géotechnique), ABTUS (Association belge des techniques et de l’urbanisme souterrains), KVIV (Association of Flemish Engineers), AIV (Association de l’ingénierie du vent) and ELGIP (European Large Geotechnical Institutes Platform) – ensure that the BBRI enjoys a privileged forum for exchanging information and experiences.

Geotechnics

The results of the various prenormative studies which have been conducted for several years now by the ‘Geotechnical’ division and the ‘Structures’ division constitute a veritable mine of information for developing the national annexes of Eurocodes 2 (Concrete Structures), 5 (Wood Structures) and 7 (Geotechnical Design), which are coordinated by the BBRI.

These studies have as their themes:
• the technique of soil mixing, an innovative programme initiated in 2009 within the framework of the Thematic Innovation Stimulation project ‘Special foundation techniques’ (both subsidised by the IWT). The application of this technique in support structures and foundation elements has grown exponentially in recent years. The study seeks to characterise the material used and develop a calculation method for this type of material in permanent structures
• support techniques, a prenormative research (subsidised by the NBN and the FPS Economy), which has made it possible to establish practice sheets relating to Berlin walls, pile curtains and the technique of soil mixing
• the design and creation of drawdowns, which will soon form the object of Belgian guidelines
• the design and execution of temporary excavations and trenches, which will also culminate in recommendations.

Other research projects bearing on foundations continued in 2009, notably concerning the in-depth analysis of various methods for predicting the aptitude for sinking steel profiles on the basis of experimental data collected earlier (ENERVIB-First DO.CA).

Mixed structures

Structural materials and wooden frameworks increasingly fulfil different functions. This multifunctional character is a theme of study which has been extensively developed by the BBRI’s research teams.

Besides self-compacting concrete, which is a constant focus of research at the BBRI, the researchers have concentrated their efforts on the following areas.

Fibre-reinforced concrete

The use of concrete reinforced by metallic,
but also synthetic fibres still suffers from the absence of official recommendations (regarding processing and calculation). The current projects being conducted on this subject by the BBRI are designed to develop testing and calculation methods making it possible to take account of the variability in the performances of the material in a structure, but also to develop new applications, notably in collaboration with the industry.

**Mixed steel-concrete floors**

The Technological Advisory Service ‘OSSAMIX’, initiated in 2007, made it possible to achieve several industrial developments in the field of mixed structures. The engineers making up this unit also collaborated on drafting the Technical Information Note n° 236 published on the subject in 2009, together with Infosteel and the De Nayer Institute.

**Multi-floor buildings with wood structures**

This research programme on the aspects of bracing against wind pressure, acoustics and fire stability was completed in 2009. Several parameters relating to the creation of panels have been studied thus far: from the influence of the type of fixation to the thickness of the panels, as well as the presence of vertical loads, the use of resilient joints, and so on.

**Conditioning of the indoor climate**

In 2009, the BBRI put its experience with the effects of wind on structures at the service of two regional projects whose objective is to develop integral approaches for digitally simulating the evolution of the temperature, humidity and ventilation in a building.

In this regard, the ‘Structures’ division possesses an exceptional building which offers the possibility of measuring the pressures on an orientable building and calibrating the digital models developed.

**What’s new from the laboratories?**

The ‘Structures’ laboratory recently commissioned a new, large-scale testing station enabling it to measure creep on ultra-high performance concretes and thus to study the problems of deformation of the material in structures over the long term. Let us recall that the laboratory is certified for a number of tests for the purpose of the CE marking and accredited by BELAC to perform bending tests on fibre-reinforced concrete.

For several years now the ‘Geotechnics’ laboratory has held a BELAC accreditation to perform characterisation tests on soils and granulates. In 2009 it executed various loading tests on new systems of piles and developed, in collaboration with third parties, new monitoring applications based on optical fibre technology.

**Standardisation – ATG and Benor quality declarations**

Since the BBRI is concerned to keep its members well-informed about the evolution of standards, but also to further integrate their feedback into the Belgian normative documents, the center worked harder than ever on coordinating the various standardisation committees for which it was recognised as the sectorial operator (SO).

The committees involved are:
- NBN E 250 Eurocodes (in collaboration with SECO)
- NBN E 288 Execution of special geotechnical works
- NBN I 182 Geotechnical investigation & testing of geotechnical structures
- NBN E 396 Earthworks (in collaboration with the BRRC), a committee newly created in 2009.

The Institute is also conducting intensive activities within other national or European committees:
- the preparation of the national annexes of various Eurocodes
- the drafting of a document of national application for the new standard with regard to the execution of concrete structures
- the standardisation of infrastructural and structural products in collaboration with PROBETON
- participation in the works on drafting the Technical Approvals in the area of buildings and civil engineering.

We finally would like to draw the attention to the fact that the 'Eurocodes' Standards Antenna has put several new calculation modules online (free of charge) on its website www.normes.be/eurocodes. One of these specifically aims at the determination of wind pressures (Wint™).
Verifying *a posteriori* that concrete conforms to the normative requirements is a recurrent concern of contractors. How to evaluate the resistance of concrete in the event of a dispute? How to be sure of obtaining a composition that is in compliance with regard to cement and water content? These are questions to which the BBRI sought to respond even more rigorously than in the past.

On top of the innovation highlighted over the past year with increasingly resistant concretes or self-flow refractory concretes, the environment and the durability of concrete remain key elements of our activities.

Numerous changes have been made to the composition of concrete in order to limit its impact on the environment. However, these changes must also make it possible to create the high-quality structures that contractors and owners are entitled to expect.

After having applied itself to improving the resistance of reinforcements to corrosion, the BBRI is now studying resistance to sulphates, which constitute the number two cause of degradation of concretes in Europe.

**Quality control**

*A posteriori* dosage of the cement and water in a hardened concrete or mortar

Does poured concrete or mortar contain enough cement? Is the water/cement ratio in conformity with the normative requirements? The answers to these questions require a chemical analysis in the laboratory.

The Belgian standard NBN B 15-250 has served as the reference on this topic for many years. However, the test method that it recommends is only appropriate for certain types of cements and concretes. Moreover, it is only reliable if the cement used is available separately or its composition is known, which is rarely the case in practice.

Indeed, if the nature of the cement is not known, it is presumed to belong to one of the three reference classes proposed by the Belgian standard, whereas the European standard NBN EN 197-1:2000 currently defines no less than 27 categories of cement, 13 of which are commonly used in Belgium. Moreover, in its present version, the Belgian standard does not recognise certain cement constituents and mineral additives which can in point of fact be present in concrete (calcareous fillers, slag, fly ash). Since 2009, therefore, the BBRI has been working together with the CRIC (Belgian Centre for scientific and technical researches for the cement industry) to revise this standard.

**Technological Advisory Service**

*‘Use of special types of concrete’*

The mission of the Technological Advisory Service ‘Use of special types of concrete’, which is subsidised by the SPW (*Service Public de Wallonie*), is to disseminate information and to encourage and assist companies in their innovative approach. The technological fields covered are, more specifically:

- the valorisation of secondary materials in concrete in the form of filler, sand or granulate
- architectonic concretes
- heavy or light concretes
- concretes with additives or which have been reinforced by fibres
- self-compacting and high-performance concretes.

**Innovation in the sector of mortars and concretes**

Besides the formulation of self-flow refractory concretes and the structural behaviour of self-compacting concretes, the BBRI is continuing a research project with a view to developing so-called ultra-high performance concretes.

**Ultra-high performance concretes**

Thanks to an extensive mastery of the concrete technology, several formulations of ultra-high performance fibre-reinforced concretes have been developed.
concretes (UHPC) have been developed. These materials are characterised by an excellent durability and a compression strength on the order of 150 N/mm², i.e. 4 to 5 times higher than an ordinary concrete.

The tests performed in 2009 demonstrated that applying a brief heat treatment could further increase the properties. An extensive testing campaign, conducted in collaboration with the VUB, also made it possible to characterise the structural behaviour of the UHPC with a view to a comparison with the calculation rules of Eurocode 2.

In the next stage of the study, practical applications will be developed in order to illustrate the many possibilities offered by the material for the prefabrication market in Belgium.

**Concrete and the Environment**

Cement production accounts for around 5 to 8 % of the world’s total CO₂ emissions. One of the main ways to reduce these emissions is to replace a part of the clinker by slag, fly ash or calcareous fillers.

**High slag-content cements**

The CEM III/B and CEM III/C cements contribute significantly to reducing CO₂ emissions (by more than 50 % in comparison to the Portland – CEM I cements) and to preserving non-renewable raw materials.

Although reserved in the past for special applications (mass concrete), these high slag-content cements are increasingly being used for environmental reasons, or when one wishes to obtain a better resistance to chemical attacks (acids, sulphates, chlorides, etc.).

However, specific rules for composition and implementation must be drafted if one wishes to limit the drawbacks linked to these cements, namely:

- slow hardening
- low resistance to frost and winter road salts
- low resistance to carbonation.

In 2009, the results of the research carried out in collaboration with the CRIC revealed the effectiveness of certain accelerating additives – notably products marketed on the basis of calcium nitrate and sodium nitrate – for increasing the curing and hardening speeds of the high slag-content cements.

The effects obtained with certain mineral additives, such as extremely fine metakaolins, are also encouraging.

The compatibility between the high slag-content cements and the currently marketed superplasticizers was also studied.

The tests on concrete will begin in 2010 and will include a study of the long-term behaviour (resistance to both carbonation and frost/thaw cycles).

**Fly Ash for Concrete**

Fly ash is composed of fine particles collected in the dust removal installations for fumes from coal-fired heating plants. It is commonly used in the production of composite cement or as an additive in concrete.

If in the past fly ash for concrete was derived exclusively from the combustion of pulverised coal, it is currently being obtained from coal burned together with co-combustion materials (olive pits, etc.). Hence, one is seeing an easing of the limitations imposed on fly ash, notably with regard to the maximum authorised fire loss.

Since 2007, thanks to its research, the BBRI has been closely following the constant evolution of this constituent and the implications it can have on the quality and durability of concrete.
Durability, European harmonisation ... and practical recommendations are the leitmotifs which have guided our actions in the field of masonry and facades throughout the past year.

With regard to masonry, the efforts concentrated on evaluating the resistance to frost/thaw cycles of masonry and terracotta bricks. In the specific area of facades, many research actions focused on the appearance and durability of insulation coating systems.

All these actions concern both research, development, standardisation and quality certificates as well as direct services to companies via technical advice, the ultimate objective always being to disseminate objective and verified information among contractors.

**Facade masonry**

The BBRI is pursuing its activities aimed at giving facing walls the desired effectiveness with regard to durability and appearance. These notably include research on the durability of facade bricks when exposed to frost, initiated in 2006 in collaboration with the CRIBC (Centre de recherche de l’industrie belge de la céramique).

Given the questions of the sector with regard to the differences and correlations between the recent European technical specification for testing the effects of frost on brick (CEN TS 772-22) and the proven Belgian method, the first biennial of this prenormative research was devoted to comparing the relative stringency of the two methods.

This project made it clear that the Belgian methodology is stricter than the European methodology in its current version. Moreover, at present it is impossible to correlate the classes according to the two methods. Thus, the declaration of the F2 class according to the CEN TS would at best correspond to the class ‘normal resistance to frost’ of the Belgian method. However, this does not exclude the possibility that a type of brick classified F2 according to the European method might behave in accordance with the Belgian method and attain the class ‘high resistance to frost’.

This conclusion is worrisome for the sector, since the declaration of the F2 class according to the European standard and within the framework of the CE marking does not necessarily mean that the brick can be qualified as ‘highly resistant to frost’ according to the Belgian standard.

We therefore believe that one can still recommend that the prescriptions coming from the Belgian methodology should continue to be preferred in the future, and that one should use bricks which have been tested according to this method, i.e. accompanied by a technical data sheet clearly stating ‘high resistance to frost’ or ‘normal resistance to frost’ according to the standard NBN B 27-009/A2.

In order to arrive at a harmonised method recognised in Europe, which is tried and tested and sufficiently strict, the BBRI and the CRIBC are striving to optimise the European method during the second biennial of research.

Besides the experimental research and study activities, our staff actively participates in the standardisation works of:
- the NBN mirror committee CEN TC 250 SC 6 ‘Eurocode 6. Masonry’ within which European standardisation is monitored and the National Annexes of Eurocode 6 are drafted
- the NBN mirror committee CEN TC 125 ‘Masonry’.

**Standards Antennas**

‘Eurocodes’ and ‘Concrete, Mortars and Granulates’

The transfer of the information collected via the monitoring of European standardisation in the field of masonry is handled by the ‘Eurocodes’ and ‘Concrete, Mortars and Granulates’ Standards Antennas, both subsidised by the Federal Public Service Economy.

Thanks to the constant contact they maintain with the various standardisation committees and institutes on the one hand and the building contractors on the other, these two Standards Antennas are able to explore and define the informational needs of the sector of Belgian SMEs and respond to them in the best possible manner.
They are also closely following the activities linked to the ATG and BENOR quality declarations within the BENOR Mark Committee and the BENOR consulting boards of BCCA (bricks), CRIC (masonry mortars) and PROBETON (concrete blocks, silico-limestones and cellular concrete).

**External Plasters**

In the area of external plasters, and in particular of plasters on insulation (ETICS – External Thermal Insulating Composite Systems with rendering), the BBRI continues to conduct actions under the aegis of the ‘Plastering and Jointing’ Technical Committee. These activities focus not only on collective research and support to information or training, but also on laboratory tests in favour of the European Technical Approvals (ETAs issued by the EOTA) and Belgian Technical Approvals (ATGs issued by the UBAtc). They are supplemented by the direct services to contractors who ask the BBRI for technical advice.

These many actions are motivated by the fact that the solution of plasters on insulation, which is advantageous in hygrothermal terms, can be associated with the challenges of the energy performance of buildings (EPB) for both new constructions and existing buildings.

The research actions conducted last year, and still in progress, focus on establishing a laboratory methodology which makes it possible to evaluate resistance to greening (growth of algae and mosses), on setting up a natural ageing site to compare laboratory experience and behaviour in the field, and on evaluating the influence of the growing thicknesses of insulation (35 cm, for example) on technical details and durability.

**Structural and Finishing Materials’ Laboratory**

Parallel to these actions, the laboratories of the BBRI are conducting, at the direct request of professionals from the sector, tests with a view to obtaining European and Belgian Technical Approvals as well as campaigns of on-site or laboratory tests as a result of cases of pathology. Test campaigns were conducted in 2009 to improve knowledge about and the capacity to predict the appearance of efflorescences.

The BBRI has great expertise with regard to evaluating the durability of construction materials, notably against climatic agents. This expertise, assembled for the benefit of contractors, was constituted thanks to stations for accelerated ageing (heat, rain, frost) which make it possible to assess the longevity of all types of construction materials.

These laboratory tests are performed within the framework of technical advice, research projects, Technical Approvals and the CE marking.
Sustainable Construction

Given the expectations of the general public and the evolution of regulations, the concept of low energy-consuming sustainable construction is gaining a place on worksites and is well on its way to becoming the new norm.

To preserve energy resources and slow down global warming, the European Commission in 2002 published its directive on the energy performance of buildings. This was transposed into the laws of the various Member States in 2006. The new energy performance regulation (EPR) thus entered into force in the Flemish Region. Since then, the BBRI has been constantly accompanying and regularly informing the sector on the subject.

Wood-frame structures

Perfectly adapted to energy-saving buildings, wood-frame construction also proves interesting in renovation because of its lightness and rapid execution as well as the fact that the processing does not require water. Interest in this type of structure is therefore constantly growing. The technical specifications relating to this technique are currently being updated, notably the STS 23, which is being revised by the BBRI and the Centre technique de l'industrie du bois (among other bodies).

Wood-frame structures and indoor air quality

Within the framework of a project evaluating the impact of construction activities on the environment, the BBRI is studying exposure to dangerous substances during the construction and use of buildings, including wood-frame buildings. The emissions of volatile organic compounds and dusts are measured in the laboratory, in buildings and on construction worksites.

Technological Advisory Service ‘Duurzame bouwschil’ (Sustainable envelope)

The Technological Advisory Service ‘Duurzame bouwschil’ (Sustainable envelope) subsidised by the IWT (Instituut voor de aanmoediging van Innovatie door Wetenschap en Technologie in Vlaanderen), transmits to the sector knowledge acquired by the BBRI with a view to promoting airtight structures free of thermal bridges as well as ‘low energy’ and passive buildings (in association with the ‘Passiehuisplatform’).

The advisors assist companies in developing innovative systems intended for roofs and facades.

Publications (on renovation, airtightness, post-insulation, etc.), revision of the STS 23 (wood frames), seminars (energy renovation of existing buildings), courses (for the federations of contractors, architects, CeDuBo, etc.) and technological advice were high-ranking priorities in 2009.

In 2009, the trend towards sustainable construction confirmed all predictions. Because the composition of roofs and facades is crucial from this perspective, it is not surprising that the BBRI’s advice was frequently sought on this subject.

Multi-floor wood-frame structures

The research is seeking to improve the standards and promote this type of building. This entails testing, calculations and modelling in order to evaluate certain hypotheses accepted for single-family dwellings.

The essential elements addressed bear on stability at break (bracing against wind pressure, rigidity, etc.), dimensional stability (shrinkage, creep of the wood), fire safety (partitioning, feedthrougths of walls), acoustical performances and vibrational comfort.

Wood-frame structures and indoor air quality

Within the framework of a project evaluating the impact of construction activities on the environment, the BBRI is studying exposure to dangerous substances during the construction and use of buildings, including wood-frame buildings. The emissions of volatile organic compounds and dusts are measured in the laboratory, in buildings and on construction worksites.

Activities conducted in the Sealing Works TC

Roof car parks

The rise in the cost of land as well as the increase in the number of cars and shopping centres has made the roof car park...
a highly appreciated structure. Because there are few recent directives on this subject, a TIN is currently being drafted.

The working group is examining a text based on bibliographic searches, extensive discussions and visits to structures. Separate subgroups are dealing with chapters concerning access ramps, maintenance, and so on.

**Connecting structures of flat roofs**

The revision of TIN 191 on connecting structures began in 2005, taking recently-developed techniques into account. The compatibility between materials is studied in a separate chapter. The detail schemes, which will be published in electronic format (for rapid integration in tender documents), are generated on the basis of the general principles in effect, then developed individually by type of sealing product.

**Mechanical fixation of sealing systems**

One-third of all the flat roofs in Belgium contain profiled steel sheets. A TIN devoted to these structures addresses the calculation of wind resistance, the choice and installation of the vapour barrier, insulation and sealing system, taking both the current Belgian standard and the future European standard into account.

**Self-adhesive sealing membranes**

Self-adhesive sealing membranes have recently been appearing on the market. In the absence of directives concerning their storage and processing, a working group has drafted recommendations on the subject.

**Activities conducted in the Roof Coverings TC**

**Tile roofs**

The scope of application of tiles has expanded to include arched roofs, facades and low-slope structures. Interlocking tiles lend themselves to slopes of less than 10°; the same applies for other tiles, combined with an adapted sub-roof (waterproofing membrane). This modus operandi has an impact on the entire roof, since the principles applicable to flat roofs must be respected (insulation, vapour barrier, etc.).

The TC decided to replace the TINs 175, 186 and 202 (terracotta tiles, flat tiles and concrete tiles) with a single document published in three parts: general principles, terracotta tiles and concrete tiles. The drafting was completed in 2009 (publication scheduled for 2010). The connections will be dealt with in a later Note.

**Metal roofs**

Given the evolution in metal coverings and accessories, the TC began drafting a new TIN (TIN 184 dates from 1992). The future document will deal with metal accessories for all types of coverings (gutters, rainwater downpipes, etc.). A later TIN will be devoted to the dimensioning of the water evacuation system.

**Standardisation - ATG and BENOR Quality Declarations**

Within the framework of the activities of the UBAtc relating to the Belgian and European Technical Approvals, the BBRI drafts test reports, verifies the declared values and evaluates the suitability for use of products, whether these are natural slates, metal tiles and sheets, concrete tiles, insulations or sealings.

The staff also participates in the BENOR consulting boards for terracotta tiles, slates, fibre-cement panels, bituminous under-layers and concrete tiles. In addition, the BBRI sits in various working groups and European Technical Committees, as well as in the corresponding Belgian mirror committees. It chairs and provides the secretariat services for the CEN TC 128 and is sectorial operator of different national standardisation committees (follow-up of the CEN TC 88, 128 and 254).

Within the framework of EOTA, the BBRI participates in the production and revision of Approval Guidelines (inverted roofs, etc.) as well as the drafting and delivery of European Technical Approvals.

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*The rules for designing and executing a flat roof must prevent pools of stagnant water.*
Today more than ever, the sector requires assistance in order to assimilate the new techniques and requirements, notably with regard to thermal and sound insulation, solar control, mechanical strength, resistance to breaking and entering, protection, decoration, fire resistance or durability.

The BBRI was particularly active in this area in 2009 through its participation in a multitude of works, including prenormative studies, Technological Advisory Services and Standards Antennas.

**THE RESEARCH**

**PERFORMANCES OF WOODEN WINDOWS**

As of 1 February 2010, the standard NBN EN 14351-1 will serve as the reference for the CE marking of doors and windows placed on the market. To spare SMEs the necessity of investing heavily in the performance of tests, the BBRI finalised its study determining the primary performances of wooden windows.

Performed in close collaboration with the sector and benefiting from the support of the FPS Economy, this study led to the development of two valuable tools which are directly available on the BBRI Internet site:
- firstly, a module for calculating the U value of wooden windows, permitting joiners to easily calculate the thermal insulation of windows as a function of their dimensions, the cross-section and type of wood, the glazing, etc.
- secondly, a database containing the primary performances (water- and air-tightness, wind resistance) of wooden windows which are representative of the Belgian market. This database rests on a large number of tests performed on the types of window configurations that are common in Belgium.

**DIMENSIONING OF SECONDARY STRUCTURES**

The prenormative research ‘Application of the Eurocodes for a harmonised reliability of secondary structures’ was completed at the end of 2009. Its primary objective was to define a normative framework for designing these facade and roof structures. This research made it possible to:
- determine, on the basis of the new standards, the different actions to be taken into account for dimensioning secondary facade and roof structures. This task resulted in the publication of Report n° 11 ‘Application des Eurocodes à la conception de menuiseries extérieures’, which can be found on line on the BBRI site
- develop a method for dimensioning facade and roof glass, taking wind and snow loads, own weight and impacts into consideration. To achieve this, many specific tests were performed in order to develop and validate the glass calculation models
- develop a preliminary tool for calculating roof and facade glass for the loads of wind, snow and own weight. With regard to impacts, dimensioning tables were generated after correlation by testing.

The first research results have already been disseminated to the Technical Com-

**TECHNOLOGICAL ADVISORY SERVICES**

‘GLASS IN BUILDINGS’ AND ‘NEW TECHNIQUES FOR PROCESSING JOINERIES’

The TAS ‘New Techniques for Processing Joineries’, subsidised by the Walloon Region, provides technological support to innovation for joinery contractors. In 2009, its staff participated in drafting practical texts concerning windows, doors, sidings, parquets, wooden structures, etc. The technical advice given and the dissemination of information concern the limits of the innovative techniques and products currently offered on the market.

The main objective of the TAS ‘Glass in Buildings’, which is also subsidised by the Walloon Region, is to help the sector to assimilate and use new products and emerging technologies. In 2009, its three priority themes were glass as a structural element, glass and personal safety, and the dimensioning of glass elements.
mittees of the BBRI as well as via direct contacts with joiners and glaziers wishing to correctly dimension their glazings, taking safety requirements into account.

**OTHER PRENORMATIVE STUDIES**

Two prenormative studies of special concern to joiners are detailed elsewhere in this report: the first is devoted to the study of multi-floor wooden structures (p. 7), while the other concerns the evaluation of the performances of wood parquets (p. 16).

‘**ROOFING AND FACADE ELEMENTS’ LABORATORY**

This laboratory conducts tests to determine the performances of the elements of a building’s envelope: windows, doorsets, facade elements, flat or inclined roofs, private and industrial doors and gates, glass, sandwich panels, sidings, skylights, verandas, wooden structures, etc.

The performances studied notably concern water- and airtightness, wind resistance, resistance to impacts, misuses, creep behaviour, resistance of the facade elements to attempts at breaking and entering, and so on.

The laboratory’s equipment makes it possible to simulate the actions of wind, rain, air, ageing, etc. in conformity with the European standards and other national or international guides.

**STANDARDISATION EVOLVES …**

Over thirty ATGs were studied and issued for different types of products: coated glasses, joinery profiles, mastics and facade coverings. The studies conducted take account not only of the recent European specifications, but also of the specifications currently being drafted within the Technical Committees of the CEN and the working groups of the EOTA.

The amendments to the standard NBN S 23-002:2007 ‘Glazing’ were updated on the basis of comments made during the public survey. They essentially concern impact behaviour and protection against noise (publication scheduled for 2010). Several publications and many presentations were produced by the BBRI in order to inform professionals of the sector about the content and practical implications of this new standard.

The drafting of various STS continued in 2009: STS 23 (wooden structures), STS 52.2 (aluminium joineries), etc.

Let us note that the Standards Antenna ‘Manual and Motorised Facade Elements’, maintained with the support of Sirris, continued its activities of awareness-raising and normative and technical support for the sector during the past year.

**A CLOSE COLLABORATION WITH THE SECTOR … TECHNICAL COMMITTEES AND TIN**

**FEEDTHROUGHS IN FIRE-RESISTANT WALLS**

To guarantee the fire resistance of a wall, it is essential that all of the functional feedthroughs be correctly stopped up – otherwise there would be little point in creating a wall having fire-resistant capabilities. In 2009 the BBRI published a number of data sheets on the subject via a working group coming from the TC Joinery (see boxed text ‘Publications of the BBRI’). The goal is to place at the disposal of installers recommendations for installation practices and to encourage the principals or owners to devote particular attention, as early as the design stage, to the feedthroughs in fire-resistant walls.

Other initiatives are also being pursued in the area of fire protection. The BBRI is notably following the evolution of joined elements via its Standards Antenna ‘Fire Prevention’.

**WOOD SIDINGS**

In 2009, the staff worked on finalising the TIN ‘Revêtements de façade en bois et en panneaux à base de bois’. This document formulates recommendations for protecting these elements from the physical and mechanical actions of natural agents such as wind, rain and radiation (UV). A large part of the future publication will be devoted to processing details. The document will be published in 2010.

**PARTICULAR GLASS STRUCTURES**

Since the lack of a good practice code for designing and implementing special structures in glass (stairways, floors, etc.) was sorely felt, the Technical Committee ‘Glazing’ started drafting a Technical Information Note on the subject. This document will emphasise the various aspects to which attention must be paid during the design and implementation of these structures in terms of dimensioning and constructive details.

The first volume, devoted to structural applications, was finalised in 2009 and essentially deals with glass floor slabs and stairs, aquariums and glazed basin walls. The second volume will be devoted to non-structural works, such as shop windows, walls in profiled glass, doors and ensembles in hardened glass, glass guardrails and separations.

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**PUBLICATIONS OF THE BBRI**

**‘JOINERY & GLAZING’**

Les Dossiers du CSTC

Infotiches N° 39
Series of six data sheets concerning the stopping up of feedthroughs in fire-resistant walls (available on our Internet site www.cstc.be).

Rapport CSTC
In the area of finishing, 2009 was marked by the publication of the TIN 237 devoted to floor coverings in ceramic tiles, as well as by the publication of a large number of files, illustrating the dynamism of the Technical Committees of the sector and their working groups.

Increasingly technical in nature, the wall and floor finishing sector has to integrate the innovations proposed by manufacturers while also adapting itself to new building requirements.

To achieve this, it can count on four Technical Committees: ‘Plastering and Jointing’, ‘Hard Wall and Floor Coverings’, ‘Paintwork, Flexible Wall and Floor Coverings’ and ‘Stone and Marble’. The ‘Joinery’ Technical Committee also makes a contribution with regard to wooden floor coverings, light partitions and suspended ceilings.

Ceramic tiles and tiling adhesives

The field of ceramic tiles and tiling adhesives has undergone rapid development for several years now. Tiles of ever-greater dimensions, tiling adhesives with constantly renewed properties, increasingly complex sealing systems, …

These are examples of evolutions that the contractor-tiler needs to master in order to keep up the level of his skills. It is for this reason that the TC ‘Hard Wall and Floor Coverings’ was especially active in terms of publications in 2009. In this context, we would like to highlight the publication of TIN 237 (the revision of TIN 137).

The ‘Structural and Finishing Materials’ laboratory also continues to execute large numbers of tests for the account of different producers with a view to the classification and CE marking of their products. This laboratory is accredited by BELAC for performing adhesion tests on adhesives and adhesive mortars for tiling.

With regard to standardisation, the engineers of the BBRI serve as the relay between the CEN TC 67, on the one hand, and FECAMO and the importers, on the other. They also act as sectorial operator for standardisation for the important problem of the slipperiness of floor coverings (CEN TC 339), as well as with regard to screeds (committee NBN E 303).

The ‘Structural and Finishing Materials’ laboratory also continues to execute large numbers of tests for the account of different producers with a view to the classification and CE marking of their products. This laboratory is accredited by BELAC for performing adhesion tests on adhesives and adhesive mortars for tiling.

With regard to standardisation, the BBRI maintained its involvement within the CEN TC 246 where it could exploit the results of its research, notably with regard to frost resistance, staining and curving. On the Belgian level it acted as sectorial operator for this same committee.

Concerning certification, the collaboration with BCCA and COPRO was confirmed with a view to the approval of quarries and certification of the finished products.

Wood parquets

The BBRI continued its research devoted to evaluating the performances of wooden floor coverings. This is designed to remedy the lack of reference standards for determining the working behaviour under variable ambient conditions.

Firstly, the survey conducted amongst parquet layers and the on-site analysis of several cases of pathology allowed one to draw conclusions on current practices and to identify the most frequent pathologies.

Then, in the prenormative approach, the test procedures (traction, shearing, consistency of the adhesive) described in the sole standard devoted to parquet adhesives (NBN EN 14293) were evaluated to determine their relevance. The results
demonstrated that these test methods require a number of adaptations in order to better characterise the adhesives for parquets and more accurately capture the performances attained in practice. These adaptations concern both the processing of the sample and the performance of the test properly speaking.

In addition to the standardised tests, several variants were tested to evaluate the influence of different parameters on the overall performances of the system (humidity level of the wood and the support, quantity of adhesive applied, etc.). These revealed that complying with the prescriptions of the TIN 218 radically reduces the risk of pathology.

However, in order to evaluate the longevity of the systems implemented, it would be advisable to continue the analyses and take account of all of the external stresses which are capable of intervening in practice.

**Flexible Floor Coverings and Paints**

Revision of the TIN n° 165 *Code de bonne pratique pour la pose de revêtements de sol souples* (1986) was completed in 2009. This document, whose publication is scheduled for 2010, is divided into two parts:

* one devoted to resilient floor coverings
* the other to textile coverings.

This revision was justified not only by the appearance of new types of coverings and adhesives, but also by the evolution in the classification and European methods for characterising products.

Also at the request of its ‘Paintwork’ Technical Committee, the BBRI finalised the drafting of a Technical Information Note on the application, in the workshop and/or on-site, of intumescent paints on steel structures. The publication of this TIN is also scheduled for 2010. This document will furnish a good practice code which until now has been missing.

**Interior Coatings**

For several years now one has noted a genuine determination to use products with advantageous performances in order to improve the indoor climate, such as the depolluting or cleaning effect and regulation of hygrothermal conditions. Three projects conducted at the BBRI made it possible to book progress in this area.

Firstly, a study on the contemporary use of lime in construction sought to evaluate the performances of interior coatings from the perspective of their interaction with the indoor climate. This is how properties for regulating the relative humidity, resistance to the development of moulds and even potential depollution could be studied and measured.

But the prospects with regard to contributing to the climate go further, since the use of phase change materials (PCM) in plaster products was investigated in the context of a second project in order to study their contribution to the thermal inertia of a room, and notably to prevent overheating in the summer.

In a third project an equivalent principle is being investigated for formulations incorporating fibres of industrial hemp, whose characteristics are thought to further improve the dynamic of hygrothermal functioning.

These aspects could be better understood thanks to precise measurements in the laboratory, combined with modelling. In order not to lose sight of processing realities, a large part of the project, conducted in collaboration with Sirris, was devoted to identifying the best mixing and projection techniques.

Moreover, as in most other areas of finishing, the BBRI continued in 2009 its activities as sectorial operator for standardisation with the committee NBN E 241.

The ‘Microbiology’ laboratory regularly performs for the account of third parties – generally manufacturers – accelerated tests of the sensitivity of finishing materials to attacks by moulds and algae, in order to help optimise the products.

The materials thus studied are ‘sown’ with spores of moulds or algae before being placed in conditions favourable for development.

**Light Partitions, Suspended Ceilings and Raised Floors**

In the wake of the publication of TIN 230, 232 and 233, a working group was set up to establish a number of technical data sheets aimed at ensuring the proper implementation of feedthroughs for walls where fire resistance performances are required.

The first six sheets were published (see boxed text on p. 15) and a seminar was organised within this framework in 2009.

**The Problematic of Appearance**

It must be acknowledged that the appearance of finishes regularly gives rise to disputes. This results from the lack of precise guidelines making it possible to objectively assess this parameter.

A study, completed at the end of 2009, was done in collaboration with the ULg and the K.U.Leuven to overcome these shortcomings. The study involved conducting psychophysical experiments in order to analyse the relationship between the physical and perceptual variations of the appearance of materials.

The technique of colorimetry was also extensively explored so as to make the measurement of colour variation as objective as possible and propose a reference protocol.
Although the activities of the BBRI with regard to sustainable construction and renovation focus primarily on the energy performances of new and renovated buildings, the problematic is naturally much broader than that. Selective recycling and demolition, accessibility, the healthiness, comfort and safety of indoor spaces are just a few of the aspects which contribute to ensuring the continuity of the life setting.

**Global Management and Recycling**

On 21 September 2009, economist Geert Noels and eco-advisor Bart Vercoutere launched a plea, in the columns of the newspaper De Standaard, for a greener and more sustainable economy based on the 'cradle to cradle' concept (C2C). They notably raised the aspects of sustainable purchasing policy and global approach to assert that, in this regard, Belgium lags woefully far behind its northern neighbour.

Moreover, they expressed regret that our compatriots – in their opinion – are unfamiliar with the use of recycled concrete in the hydraulic civil engineering structures, while this is a common practice in the Netherlands.

Well, these gentlemen are mistaken, because the C2C concept, integrated chain management, the use of recycled granulate in high-quality concrete structures and even sustainable purchasing management were featured in the 2009 agenda policy right here at home, and particularly in the construction sector.

We should also note that Belgian companies have been using recycled concrete in hydraulic structures since the 1980’s. The lock of Berendrecht, built at the initiative and under the auspices of the BBRI, is a prestigious example of this.

Once again this year the BBRI was very active in this field. A first project which deserves special mention, and which was carried out with the financial support of the Research Committee of the Fonds Gravier, concerns integrated chain management. VALRECON, a TETRA project supported by the IWT, was launched last November at the initiative of the Katholieke Hogeschool Brugge-Oostende and aims to produce high-quality concrete containing a large share of recycled granulate replacing the larger granulate.

**Sustainable Construction**

Sustainable construction requires an integrated approach, because it is a particularly broad concept touching on energy savings and the reduction of CO₂ emissions as well as ecological materials, water management, comfort, accessibility and the cost of projects.

Within this framework, the BBRI contributes to various standardisation committees, both international (ISO TC 59 SC 17) and European (CEN TC 350). On the national level, as co-initiator of the VALIDEO project, it made sure that labellisation and certification were placed on the Belgian political agenda.

Our staff thus handled the follow-up, in 2009, of the developments of the Belgian Sustainable Building Council (BSBC), in consultation with the professional organisations and partners of VALIDEO.

Within a sustainable construction context,
it is essential to consider a building’s entire life cycle. That is why this year the studies were oriented on life cycle analysis (LCA) and primarily the life cycle costs (LCC) and the evaluation of the environmental impact.

Moreover, a new prenormative project on the life cycle costs was launched with the support of the Bureau de Normalisation (NBN) and the FPS Economy; the SUFFIQUAD project, which explores the complex interactions between quality of life, environmental impact and the costs of individual and multi-family dwellings, was able to continue thanks to the financial support of BELSPO.

Finally, substantial progress was achieved in the LEHR programme, which investigates the ecological and financial impact of renovation projects on housing units which are particularly economical in terms of energy.

CONSTRUCTION AND INDOOR ENVIRONMENT

The European coordination action PERFECTION, launched in 2009 at the suggestion of the BBRI, seeks to improve the indoor environment of buildings, a parameter which has a significant impact on the productivity of employees.

In addition to indoor air quality, the study focuses on the aspects of safety, comfort, accessibility and on the positive stimulation of employees.

To guarantee a building’s accessibility, it is essential to take fire safety and the conditions for evacuation in case of incident into account. In this perspective, the BBRI is continuing to develop an evaluation model for the accessibility, fire safety and evacuation of buildings, with the collaboration of various partners (Ecole supérieure de la province du Limbourg, Transport & Mobility Department of the City of Leuven, the non-profit association In-HAM) and the financial support of the IWT.

Since construction products are capable of significantly influencing indoor air quality, the assessment of their toxicity represents a large part of the works conducted within the framework of the CEN TC 351 ‘Construction products’ and the group PT 9 ‘Dangerous substances’ of the EOTA. The BBRI handles not only the follow-up of these initiatives, but also intervenes as coordinator of the HEMICPD project, which has made it possible to lay the foundations of a Belgian model for evaluating emissions of construction materials.

SUSTAINABLE RENOVATION TECHNIQUES

Controlling humidity problems unquestionably constitutes an essential facet of any renovation process. The BBRI therefore developed a specific procedure making it possible to test surface water repellents. Recently our laboratories developed a new test method for characterising the effectiveness of injection-applied products for the treatment of rising damp.

In most cases, humidity problems are indissociable from the presence of salts, for which no intervention technique has proved satisfactory until now.

This problematic was studied within the framework of research subsidised by the IWT, which seeks to remedy the phenomenon by economical and practical solutions.

To close this chapter, let us recall that while buildings can generally be renovated, it is perhaps even more useful to make them the object of preventive maintenance. The European project CHIC (Cultural Heritage Identity Card) thus seeks to rationalise the management of tangible cultural heritage assets.

The development of a preventive maintenance procedure should make it possible to manage historical buildings in a less expensive and more effective way, so as to be able to guarantee their preservation to a maximum degree.
Improving the energy performances of buildings and maintaining a healthy and comfortable indoor climate, in both new construction and renovation, are at the centre of the BBRI’s activities in the area of energy, while water management and legionella retain full attention with regard to health.

Energy Performances

The different components of the regional regulations on the energy performance of buildings are progressively entering into force in Belgium’s three Regions. Significant progress has been made on various levels:

- Energy performance of new structures in the Walloon Region
- Energy certification of housing units in the Flemish Region
- Taking constructive nodes into account in the EPB.

These evolutions have obviously marked the BBRI’s activities in the energy field.

In order to ensure coherence in the evolution of the regional EPB regulations, the BBRI assists the three Regions in the EPB platform. The objective of this platform set up in 2007 is to ensure that the regulations evolve in a coordinated way, particularly with respect to the calculation methods. This is notably attested by the developments common to the three Regions which recently took place within the framework of the ‘EP-Bridge’ project with regard to constructive nodes.

Other actions supporting the regulations continued via the prenormative research EPINS, such as the development of the products database or taking innovative systems into account in the regulations according to the equivalence principle.

In the Flemish Region the BBRI is also assisting the administration in charge of energy (VEA) on the practical aspects of applying the EPB regulation. The assistance given to the Walloon and Brussels Regions with a view to transposing the European Energy Performance of Buildings Directive also continued.

In the Walloon Region, the BBRI helped to educate the sector about the new regulation by setting up specific training courses for contractors and by preparing training sessions for designers which are scheduled for 2010.

An important effort was also made to prepare the introduction, in 2010, of the energy certification for existing dwellings when sold or rented. For this purpose we are developing the certification methodology and handling the scientific supervision of the development of the software and the training of the trainers.

In addition, the BBRI continued finalising version 2 of the voluntary Procédure d’avis énergétique for existing housing units.

Moreover, the action launched in 2004 of creating exemplary buildings ‘Construire avec l’énergie... naturellement’ entered a new phase, in the sense that the new housing units erected within this frame-

Standards Antenna

‘Energy and Indoor Climate’

Energy performance, lighting and visual comfort, thermal insulation, heating and cooling as well as ventilation and air quality are the five main areas of this Standards Antenna, supported by the FPS Economy.

The participation of the staff in various Technical Committees of the NBN and the CEN makes it possible to actively follow the Belgian and European standardisation, while furnishing information to the public. The latter can be divided into three major categories:

- Advisors and designers (architects, consultancy offices, etc.)
- Installers (heating engineers, electricians, lighting specialists, companies specialised in indoor climate regulation or in charge of thermal insulation works, etc.)
- Producers and distributors of insulating materials, equipment for heating, cooling, lighting, glazings, shading devices, etc.

The information transfer takes place via the site www.normes.be through articles, technical reports, lectures and seminars. The Internet site features a link to a database permitting users to access the object of different standards.
work can now benefit from a certificate attesting that they were designed and created to save energy.

Energy renovation is also of great importance. In 2009, for the account of the administration in charge of energy in the Flemish Region, the researchers conducted a study to develop an action plan for implementing the programme to renovate the stock of existing dwellings by 2020.

On the European level, the BBRI also leads the ASIEPI project whose objective is to ensure the proper application of certain points of the directive, such as taking account of thermal bridges, innovative systems, summer comfort as well as the audit of the regulations in the member countries.

The Envelope of a Building

Several actions were conducted on the theme of building renovation.

The LEHR project dealing with ‘low-energy’ renovation of housing units was completed. In this context, a technical guide currently being prepared addresses different measures, such as insulation, airtightness, the replacement of frames and glazings or improvement of heating and ventilating installations.

The study on the post-insulation of hollow walls by filling their empty inner space was focused on the possibilities for application of this technique. Several aspects were analysed, such as the characterisation of the products, the processing techniques or the establishment of a quality control for works by integrating these techniques within the framework of the Technical Approvals (ATG).

The strategic multidisciplinary research programme HAM, which bears on the transportation of heat, air and humidity within walls and roofs, continues in collaboration with research and development offices as well as the universities of Louvain, Ghent and Eindhoven. Its goal is to establish an integrated approach to the phenomena so as to create buildings which are energy efficient and offer a better indoor climate.

Within the framework of the RETERMAT project, the researchers studied the impact of phase change materials (PCM) on the dynamic thermal behaviour of buildings.

The Technological Advisory Service ‘Duurzame Bouwschil’ (Sustainable envelope, see boxed text on p. 12) subsidised by the IWT, lends its support to companies wishing to develop roof and facade systems which are innovative with regard to energy performance.

The BBRI is also participating in the development of a system of prefabrication of evolutive modular housing units and in the follow-up of the process of construction of an office building according to the passive standard.

Finally, the Standards Antenna ‘Energy and Indoor Climate’ (see boxed text on p. 20) transmits — via the Internet site www.normes.be or lectures — information about the standards and regulations on energy performances, heating, climate control, ventilation, insulation, shading devices, etc.

Light and Buildings

For more than ten years now, the BBRI has been developing its knowledge in the area of lighting and visual comfort, and disseminating it throughout the sector. The diversity of measurement infrastructures available at the experimental station in Limelette is unique in Europe. Several studies are being conducted on the subject.

In the residential sector, the ECLOS project is looking at lighting in social housing units. Mainly focused on products, it is exploring the possibilities for industrial application of energy-saving lights and advanced management systems in buildings undergoing renovation.

The prenormative project CODA-LIGHT

PUBLICATIONS OF THE BBRI
‘ÉNERGIE, INDOOR CLIMATE & INSTALLATIONS’

Thermal comfort – Visual comfort
• Quand le chauffage ‘basse température’ devient la norme. Les Dossiers du CSTC 2009/4, Cahier 15.
• La classification des luminaires. Les Dossiers du CSTC, Les Dossiers du CSTC 2009/2, Cahier 15
• Des rendements supérieurs à 100 %. Les Dossiers du CSTC 2009/1, Cahier 6.
• Plus de confort avec moins d’énergie. Les Dossiers du CSTC 2009/1, Cahier 17.

Sanitary installations
• Comment éviter la stagnation dans une installation d’eau potable ? Les Dossiers du CSTC 2009/4, Cahier 16.
• Installation de panneaux solaires en toiture. Les Dossiers du CSTC 2009/2, Cahier 6.
• Installations sanitaires : de Cnossos à la navigation spatiale. Les Dossiers du CSTC 2009/1, Cahier 12.

Using smoke to detect an air leak at the level of a window.
A partnership between the lighting technology laboratory of the Katholieke Hogeschool Sint-Lieven (KaHo) of Ghent and the BBRI, the innovation assistance project ‘Groen Licht Vlaanderen’ is supported by more than twenty Flemish companies (primarily SMEs) which wish to expand their knowledge in the area of energy-efficient lighting.

This project seeks to ensure the dissemination of knowledge about lighting via the organisation of seminars, lectures, specialised courses, etc. It also proposes to establish and consolidate the synergies between companies of the lighting and home automation sector, on the one hand, and the architects, designers and government authorities, on the other.

But it above all intends to strengthen the competitive position of the small and medium-sized companies active in the field which are confronted with the effects of globalisation, by proactively stimulating innovation and by monitoring the evolution of the European requirements concerning quality and energy performance.

The Thematic Innovation Stimulation (TIS) action ‘Groen Licht Vlaanderen’, supported by the IWT (see boxed text above), makes it possible to remain in close contact with the lighting sector. Assistance was also provided to the Flemish administration in charge of energy (VEA) for drafting the technical content of the ‘lighting’ part of its Internet site.

In addition, our staff is active within the IBE-BIV (Institut belge de l’éclairage) and participates in the International Commission on Illumination (CIE).

TECHNICAL INSTALLATIONS

HIGH-PERFORMANCE CLIMATE CONTROL AND VENTILATION INSTALLATIONS IN TERMS OF ENERGY

To be able to guarantee a healthy and comfortable indoor climate, a low-energy building must be equipped with high-performance technical installations.

For example, a ventilation system (either natural or mechanical) will be necessary in order to ensure a supply of fresh air and evacuate the used air (which has become laden with humidity and various pollutants). Inasmuch as the functioning of such an installation is inevitably accompanied by a certain energy consumption, during the heating season it must be used in a sound and controlled manner, for example by combining it with a heat recovery system.

The project Q-INTAIR, conducted in collaboration with the Flemish Technological Research Institute (VITO), is designed to study the influence of ventilation strategies on indoor air quality.

The resounding success of techniques for using renewable energies, such as solar water heaters, photovoltaic electricity production systems, heat pumps, pellet-burning stoves, etc., must not make us lose sight of the necessity of a proper quality control, even if the regulation is relatively silent on the subject.

The BBRI is currently developing, via the project Q-DIRECT, quality procedures intended for the suppliers, designers and installers of such systems in order to increase the confidence of their customers. In this context, the non-profit association QUEST (Quality Centre for Sustainable Energy Technologies) awards quality labels to companies and installers whose systems have demonstrated their effectiveness.

When renovating ventilation and heating installations too, it would be advisable to encourage new systems presenting good energy performances. The practical guides drafted for this purpose within the framework of the LEHR programme make it possible to evaluate the impact of the envisaged renovation works on the primary energy consumption characteristic of the installations concerned.

As for the staff of the Standards Antenna ‘Energy and Indoor Climate’, they are actively participating, firstly, on the revision...
The mission of this Technological Advisory Service, subsidised by the IWT, is to encourage, via direct assistance to companies, the application and integration of energy-efficient HVAC installations in energy-saving buildings: heat pumps, thermal and photovoltaic solar systems, sophisticated ventilation systems with heat recovery, condensation heaters associated with (very) low-temperature water heat emission systems, solar protection systems, passive cooling techniques and combined heat and electricity production. It is in this context that the revision of Report no 1 ‘Dimensionnement des installations de chauffage central à l’eau chaude’, first published in 1992, was initiated last year.

The advisors also issue advice specifically relating to the EPB, highlighting the improvement of the E level of a building and making it possible to evaluate the real performances of innovative systems. The Advisory Service valorises the knowledge and experience thus acquired via numerous collective actions (publications, lectures, etc.).

In Brussels and Wallonia, this assistance is offered respectively via two Technological Advisory Services : one, ‘Eco-Construction and Sustainable Development,IBUTS’ (Innovatieve Klimatechnieken: Integratie van Energie-efficiënte HVAC-installaties in energiezuinige gebouwen’ (Innoklima – Innovative Climate Control Techniques : Integration of Energy-Efficient HVAC Installations in Energy-Saving Buildings)

of important Belgian standards relating to the calculation of thermal losses of buildings and, secondly, on the drafting of new prescriptions concerning the installation of heat generators in boiler rooms and the evacuation of combustion gases.

The participation in the activities of the Air Infiltration and Ventilation Centre (AIVC) enables the Belgian building sector (via the BBRI) to access the databases of the AIVC. The objective of this international body, created by the International Energy Agency, is to disseminate information about the ventilation of buildings, air infiltrations, indoor air quality, thermal comfort and the rational use of energy.

The potentialities of the PCR technique (Polymerase Chain Reaction) were also investigated. Expanding on this research, the BBRI participated last year in the international study KWR 2009.004, which is intended to validate the growth method by an analysis of contaminated water samples (industrial and cooling tower wastes) and a comparison of the results with those of the PCR technique.

At the request of the Flemish Agency ‘Zorg en Gezondheid’, the BBRI published more than twenty data sheets (Infofiche n° 38, see boxed text Publications on page 21) pinpointing the main zones of hot and cold water sanitary installations capable of becoming a site for the development of legionellae.

Another data sheet on which work began, deals with the design of overflow valves for flat roofs having banked edges. This document will remedy the shortcomings of the standard NBN EN 12056-3 on the dimensioning of rain water evacuation installations, which does not address the problematic of overflow valves.

Finally, several sheets established in 2009 bear on evaluating the suitability for use and conformity of tubes intended for different applications (distribution of hot and cold water under pressure, evacuation of domestic waste water, rainwater evacuation, heating, distribution of gas in non-industrial installations, etc.).

The risk of legionella developing is greater in non-insulated water tanks.
2009 was the year the building site of our new acoustics laboratory was opened. Once again this year, the division sought to conduct both prenormative and innovative studies and to disseminate the acquired knowledge throughout the construction world in the broadest sense of the term via lectures, publications, technical advice and the website of the Standards Antennas.

Research and digital modelling

One great novelty in our research activities in 2009 was the use of digital simulations by the finite element method (FEM). These make it possible to conduct parametric studies more quickly and at lower cost.

In addition, the power of today’s computers is such that it is possible to resolve FEM acoustical models at increasingly high frequencies within very brief calculation periods. A validation study was performed in order to assess the limits of this type of simulation.

The development of these digital models led us to define a new predictive method for the purpose of evaluating the improvement of the acoustical insulation between rooms achieved by installing flexible joints along junctions.

The research carried out in 2009 also made it possible to develop a whole series of test benches for characterising the vibro-acoustic transfer properties of flexible joints, which will reinforce our position as leader in this innovative area.

Acoustical insulation of wood structures

The experimental studies primarily focused on methods for reducing lateral transmissions of noise. The research also concentrated on developing a method for measuring the vibration reduction index $K_i$ in the specific case of light structures.

This index, essential for predicting noise and developing construction guidelines, forms the object of discussions within the international working group COST FP0702.

The problematic of vibrations in buildings

The activities of the ‘Acoustics’ division were expanded to include problems of vibrations in buildings. Various actions were conducted for the purpose of ensuring and monitoring respect of the standards in effect with regard to external sound sources.

Construction guidelines were established to limit the vibratory discomfort generated in wooden floors.

Finally, thanks to testing both on site and in the laboratory, we were able to verify, for different types of buildings, the re-
spect of the requirements imposed by the Eurocode 5 on internal sound sources.

STRUCTURAL NOISE OF INSTALLATIONS

It isn’t easy to evaluate the noise caused by technical installations in a building. Several techniques were used in order to determine the transfer of vibrations caused by an installation in the structure of a building. The simplest technology requires a measurement of power and speed. Although it is extremely difficult to determine a power directly, one can circumvent the difficulty by means of an indirect reciprocal mechano-acoustic method.

Another tested method (the so-called ‘reception slab’ method) is relatively new and makes it possible to determine the vibratory power emitted in a slab posed according to a standardised procedure.

Finally, the mobility method uses the transmission speed of the noise produced by an installation disconnected from the structure of the building.

It turns out that the results obtained with the method of determining the vibratory power are dependent on the installation-structure configuration, so that there is no single technique which yields the best results in all cases.

DRAFTING OF THE DRAFT STANDARD prNBN S 01-400-2

In 2009, a first working version of the new draft standard prNBN S 01-400-2 defining performance criteria for school buildings was prepared in collaboration with the research partners of the K.U.Leuven and of the CEDIA unit of the University of Liège.

As was the case for the first part of the standard (NBN S 01-400-1), proposals were formulated and submitted to the ‘Building Acoustics’ normative committee of the NBN.

In addition to a critical evaluation of the requirements defined in the standards NBN S 01-400-1977 and NBN S 01-4001987 and a comparison of the criteria with foreign prescriptions, the proposed requirements were compared with recent studies as well as practical experiments conducted in several schools, then adapted as necessary.

CONTEX-T

CONTEX-T is a research programme dedicated to textile architecture, led by CENTEXBEL in collaboration with 30 European partners. The objective of this multidisciplinary research is to expand the knowledge of the European textile industry about this type of construction and to ensure it a competitive international position.

The BBRI concentrates primarily on the acoustical aspects of the project and handles coordination tasks with regard to building physics and fire safety.

In 2009, the staff developed a calculation model making it possible to simulate the characteristics of absorption and acoustical insulation of the multi-layer systems associating one or several membranes, whether or not microperforated, with porous materials (non-wovens), layers of air and/or elastic materials (panels).

Simulations of double-membrane systems with or without porous filling were compared to measurements performed in the laboratory.

STANDARDS ANTENNA

2009 marks the construction of the first buildings subject to the new acoustical standard NBN S 01-400-1:2008.

Requests relating to the application of this standard having become very numerous over the past year, the Standards Antenna ‘Acoustics’ quite naturally served as a gateway for the questions that professionals are asking on this subject.

The information sessions were also multiplied in order to prepare all the actors of the sector for this revolution in their normative acoustical habits.

One of the major challenges, which was partially met in 2009, consisted of putting online construction guidelines, thematic articles and calculation modules making it possible to simplify the use of the acoustical prediction models.

DEVELOPMENT ACTIVITIES IN THE LABORATORY AND ON SITE

The ‘Acoustics’ laboratory of the BBRI performed more than 215 acoustical characterisation tests of materials in the laboratory within the framework of development files.

The most frequently requested tests concerned measurement of the sound reduction index of glazings and window frames, and the characterisation of the products intended for floating screeds.

On site, over fifty buildings were studied within the context of development tests, primarily in order to verify the conformity of the insulation relative to the standards in effect.
In 2009, the staff of the ‘Management, Quality and Information Technologies’ division concentrated on structural improvement of the construction company and optimisation of its projects.

This year, various awareness-raising events were organised to inform construction professionals about what information and communication technologies can contribute to the various organisational processes. These actions, which are based on the first-hand accounts of contractors, made it possible for numerous participants to identify effective solutions which are adapted to their SME.

In addition, the division disposes of its own catalogue of training courses. For example, hundreds of training modules were dispensed in 2009 on all organisational aspects of the company (cost price calculation, planning, IT, quality control), with a view to encouraging the professionals to make more intensive use of the methods and tools presented.

The sector possesses various specific reference systems which can lead to either the ISO 9001 certification or the CoQual or Qualibouw labellisation. These quality management systems offer contractors avenues allowing them to improve the functioning of their company and increase customer satisfaction. This year, the division helped many certified contractors to deal with the passage of the ISO 9001 standard to its new (2008) version.

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**E-MANAGEMENT AT THE HEART OF THE COMPANY**

In a constantly developing world, and in light of the current economic situation, companies have to be increasingly efficient in controlling their costs and resources. The modernisation of production tools, but also management and communication tools, is pushing today’s contractors to become better informed and receive training in these new techniques. The very profitability and competitiveness of the company is at stake.

**RISK MANAGEMENT IN CONSTRUCTION**

This project, carried out with the collaboration of the K.U.Leuven and the financial support of the IWV (Instituut voor de aanmoediging van Innovatie door Wetenschap en Technologie in Vlaanderen), examines the applicability of risk management to the planning of construction works in Belgium.

This year the focus was placed on performing financial risk analyses, measuring the impact of various forms of contract and collaboration, and finally optimising the risk analysis tool used within the framework of the project.

**E-BBRI MADE TO MEASURE**

Having served the construction sector for many years now, the BBRI, via its ‘Communication and Training’ division and its ICT department, draws extensively on the broad arsenal of digital tools available so as to ideally adapt itself to the specific needs of its members.

Helping contractors optimise their search for information is another of our daily concerns. ■
Despite globalisation, the interaction between the owner and public authorities often remains a local event based on regional SMEs, traditions and smooth communication. Nevertheless, the construction sector remains just as sensitive to the consequences of European unification, notably with respect to the ‘critical’ trades and the necessity of sustainable development.

In order to keep Belgian companies informed about the many developments in the European construction sector and to defend the interests of Belgian SMEs, the BBRI sits in numerous bodies and actively participates in various European and international initiatives.

**THE CE MARKING**

In 2007, the European Commission took the first concrete initiatives aimed at revising the Construction Products Directive (89/106/EEC). The definitive version of this text should be approved in 2010, and could enter into effect in 2012.

**EUROPEAN COMMITTEE FOR STANDARDIZATION (CEN)**

The activities of the CEN (www.cen.eu) are monitored in various mirror committees of the Bureau de Normalisation (NBN, www.nbn.be).

Within this framework, the BBRI chairs the committees E277 (Suspended Ceilings), E156 (Ventilation of Buildings) and E33 (Joinery). In all, the BBRI heads around 25 Belgian mirror committees.

**UNION BELGE POUR L’AGRÉMENT TECHNIQUE DANS LA CONSTRUCTION (UBATC)**

There exists in Belgium, for products which are not subject to specific standards, a system of Technical Approvals (ATG) issued by the UBATc (www.ubatc.be), which recently took over the activities of the FPS Economy with regard to approvals.


The EOTA drafts guides enabling national institutes to grant European Technical Approvals (ETAs) to products which are not subject to harmonised standards.

As for the UEAtc, it drafts guides for the approval of systems and properties which, although important for processing, are not subject to any regulation.

**ACTIVITIES IN NETWORKS**

The BBRI collaborated actively in various European networks. Below we shall briefly review some of the activities carried out in this context.

**EUROPEAN CONSTRUCTION INDUSTRY FEDERATION (FIEC)**

The FIEC (www.fiec.org) is an important link in the dissemination to contractors of information regarding the above-mentioned activities. Our country is represented therein by the Confédération Construction, which relies on the BBRI for technical aspects.

The latter chairs and handles the secretariat for Technical Committee ‘FIEC 1’.

**EUROPEAN NETWORK OF BUILDING RESEARCH INSTITUTES (ENBRI)**

The BBRI also provides the secretariat for the ENBRI (www.enbri.org), a network of 23 major research centres. In 2009, the ENBRI actively participated in the Seventh Framework Programme of the European Union, and strove to develop the collaborations among its members.

**EUROPEAN COUNCIL FOR CONSTRUCTION RESEARCH, DEVELOPMENT AND INNOVATION (ECCREDI)**

This network (www.eccredi.org) seeks to stimulate research and innovation in European construction, and to do so conducts a wide range of actions to secure European funding for research and development in the sector. In 2009, it cooperated in the organisation of the third conference of the ECTP.

**EUROPEAN CONSTRUCTION TECHNOLOGY PLATFORM (ECTP)**

The ECTP (www.ectp.org) is a platform which coordinates research in the construction sector on the European scale. Various BBRI staff are members of this network’s committee of experts and working groups.

A major step was taken within the framework of the initiative E2B (www.e2b-itl.eu) thanks to the inclusion of the theme of ‘construction’ in the European Union’s economic recovery plan. ■
Technical Assistance

The process of construction is becoming more complex by the day, with the evolution of regulations, the facilitation of access to innovative materials and the ever-shorter construction deadlines. All of this forces contractors and other building professionals to pay constant attention to the rapid developments in the sector.

For this reason the BBRI Internet site offers permanent access to all of the relevant information generated by the applied research conducted by the Institute.

However that may be, the creation of every building is an intrinsically unique event, so that personalised assistance remains necessary. This technical support is handled by the ‘Technical Advice and Consultancy’ department (TAC), whose versatile members are available at all times for the entire sector.

In other words, this department strives to directly translate the results of the BBRI’s research. In this context, the help line on duty every day is the ideal means of intervention for responding to the flood of questions that come in from every construction sector and sub-sector.

Moreover, thanks to the electronic request form available on our Internet site, construction professionals can quickly submit to us the technical problems they encounter, no matter how complex. They are then provided ‘tailor-made’ advice (in writing, if necessary).

Otherwise, it is also possible to organise a visit to the worksite in agreement with the company in charge of the works or the judicial expert (in the event of a dispute before the court).

In 2009, this manner of operation enabled our staff to offer no fewer than 25,000 pieces of technical advice. In so doing, we constantly verify the expertise and objectivity of the reports, so that they can form a reliable basis for all interested parties.

To ensure high-quality assistance at all times, the ‘Technical Advice and Consultancy’ department in 2009 developed the necessary procedures so that its services satisfy the quality criteria of the ISO 9001 standard.

Moreover, the table below, which presents the results of the satisfaction survey conducted among professionals, reveals that these efforts were particularly appreciated by the sector. This survey was carried out in 2009 within the framework of our ISO 9001 certification.

Finally, our staff cooperated actively in the organisation of several construction trade fairs, training courses and information sessions, as well as in a large number of working groups within various Technical Committees.

The synergy between the ‘Technical Advice and Consultancy’ department and the ‘Research and Innovation’ directorate was further strengthened.

<table>
<thead>
<tr>
<th>Criteria considered</th>
<th>Evaluation on a scale of 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality of the advance contacts with our services</td>
<td>8.8</td>
</tr>
<tr>
<td>Period within which the visit was scheduled and/or organised</td>
<td>8.4</td>
</tr>
<tr>
<td>Adequacy of the analysis during the visit (boreholes, measurements, etc.)</td>
<td>9.5</td>
</tr>
<tr>
<td>Clarity of the advice given and/or of the report</td>
<td>8.9</td>
</tr>
<tr>
<td>Professionalism of the advice issued and/or of the report</td>
<td>9.2</td>
</tr>
<tr>
<td>Completeness of the advice and/or of the report</td>
<td>8.8</td>
</tr>
<tr>
<td>Usefulness of the advice and/or of the report</td>
<td>8.8</td>
</tr>
<tr>
<td>Form and presentation of the advice and/or of the report</td>
<td>8.9</td>
</tr>
<tr>
<td>Period of preparation and transmission of the advice and/or of the report</td>
<td>8.0</td>
</tr>
<tr>
<td>Average</td>
<td>8.8</td>
</tr>
</tbody>
</table>

Results of the satisfaction survey conducted in 2009 amongst professionals, within the framework of the ISO 9001 certification of the ‘Technical Advice and Consultancy’ department.
Recywall

The primary mission of the association Recywall (www.recywall.be) is to help companies to valorise and recycle their wastes. In 2009, the newsletter ‘Recyflash’ presented the results of the Filltech research project relating to the valorisation of calcareous fillers in concrete.

Tradecowall

The objective of this company is to seek solutions for the treatment of inert wastes and excavation soils coming from construction and demolition worksites. 2009 was marked by the acquisition of a new landfill site in Fleurus (www.tradewall.be).

Belgian Construction Quality Society (BCQS)

BCQS (www.bcqs.be) has long been training and accompanying companies with a view to obtaining an ISO, Construction Quality or VCA certification. This year, emphasis was placed on environmental management, while the training of installers of fire-resistant doors continued at the same time.

Belgian Centre for Domotics and Immotics (BCDI)

In 2009, the BCDI (www.bcdi.be) contributed its support not only to the non-profit association In-HAM, to the VIS/STI projects ‘Technological Innovation in the Health Care Sector’ and ‘Design Guide for Integrated Home Automation’, but also to various congresses, forums and workshops. Information on this subject is disseminated via the Information Bulletin ‘BCDI-News’.

Quality Centre for Sustainable Energy Technologies (QUEST)

This organisation prepares quality procedures and monitors the attribution of quality marks to suppliers and installers who offer sustainable and innovative systems. In 2009, it concentrated its efforts on getting great attention paid to these new systems in the three Regions (www.q4q.be).

Vlaanderen Bouwt (VLABO)

VLABO (www.vlaanderenbouwt.be) accompanies the communal administrations and the social welfare offices in designing and building housing units and service residences. The urbanistic, architectural and technical qualities of the projects are taken into account, as well as their durability and cost.

Organisatie voor Duurzame Energie (ODE Vlaanderen)

This group (www.ode.be) organises the consultation between companies of the renewable energy sector and the public authorities through various thematic platforms and professional organisations such as the ‘Warmtepompplatform’, the ‘Biomassa platform’ and the ‘Groene Stroom’ working group.

Belgian Construction Certification Association (BCCA)

BCCA (www.bcca.be) is one of the Belgian leaders with respect to certification in construction and, thanks to this status, possesses accreditation from the BELAC office. In addition, for several years now this non-profit association has been supporting the collective label ‘Construction Quality’ and regularly performs production inspections in the context of the CE marking.

Cobomedia

This association (www.cobomedia.be) works to improve contacts with the construction sector. For this purpose it organises seminars and courses, in collaboration with the ABEE, the Cefora, the FABI, the UBC, the FPS Economy, the NBN, the Confederation Construction, the GBB, the FPS Mobility and Transport, etc.

Centrum Duurzaam Bouwen (CeDuBo)

In 2009, CeDuBo organised numerous seminars, exhibitions and training courses on the theme of sustainable construction. It also coordinates the ‘Steunpunt Duurzaam Bouwen en Wonen Limburg’ and the ‘Transitiarena duurzaam wonen en bouwen’ (www.cedubo.be).

Belgian Centre for Durability and Immobility (CeDiMo)

In 2009, CeDiMo contributed its support not only to the non-profit association In-HAM, to the VIS/STI projects ‘Technological Innovation in the Health Care Sector’ and ‘Design Guide for Integrated Home Automation’, but also to various congresses, forums and workshops. Information on this subject is disseminated via the Information Bulletin ‘BCDI-News’.

Vlaamse Centrum voor Duurzaam Bouwen en Wonen (Vlaamse Centrum voor Duurzaam Bouwen en Wonen)

This organisation prepares quality procedures and monitors the attribution of quality marks to suppliers and installers who offer sustainable and innovative systems. In 2009, it concentrated its efforts on getting great attention paid to these new systems in the three Regions (www.q4q.be).
The activities of the BBRI are oriented directly by fifteen Technical Committees. Eleven of them are the direct representation of a branch of the construction industry (painters, joiners, heating equipment installers, etc.) and are composed essentially of contractors. The other Committees focus on subjects of interest to several branches, such as company management or acoustics. These are also composed of professionals active in construction. This ‘bottom-up’ approach makes it possible to closely tailor the activities of the BBRI to the needs of the sector.

**Rough Structure**

**Chairman**
L. Eeckhout

**Members**

**Engineers-leaders**
N. Huybrechts, B. Parmentier

**Engineers TAC**
S. Watthy, J. Wijnants

**Heating and Climate Control – HVAC**

**Chairman**
R. Debruyne

**Members**

**Engineers-leaders**
K. De Cuypers, J. Schietecat

**Engineers TAC**
I. De Pot, V. Jadinon

**Paintwork, Flexible Wall and Floor Coverings**

**Chairman**
J. Meuleman

**Members**

**Engineer-leader**
V. Pollet

**Engineer TAC**
W. Van de Sande

**Hard Wall and Floor Coverings**

**Chairman**
W. Bauters

**Members**

**Engineers-leaders**
F. de Barquin, T. Vangheel

**Engineers TAC**
L. Firket, J. Van den Bossche
**Technical Committees**

**Glazing**
- **Chairman**: H. Vigoureux
- **Engineer-leader**: V. Detremmerie
- **Engineers TAC**: F. Caluwerts, L. Lassoie

**Sealing Works**
- **Chairman**: J. Coumans
- **Engineers-leaders**: E. Noirfalisse, E. Mahieu
- **Engineer TAC**: E. Mahieu

**Roof Coverings**
- **Chairman**: G. Pierrard
- **Engineer-leader**: F. Dobbels
- **Engineers TAC**: E. Mahieu, O. Vandooren

**Sanitary and Industrial Plumbing, Gas Installations**
- **Chairman**: A. Dooms
- **Engineer-leader**: K. De Cuyper
- **Engineers TAC**: I. De Pot, V. Jadion

**Joinery**
- **Chairman**: M. Collignon
- **Engineers-leaders**: Y. Martin, B. Michaux
- **Engineers TAC**: F. Caluwerts, L. Lassoie

**Stone and Marble**
- **Chairman**: H. Vanderlinden
- **Engineers-leaders**: F. de Barquin, D. Nicaise
- **Engineers TAC**: L. Firket, J. Van den Bossche
Plastering and Jointing

Chairman: J. Van den Putte
Vice-Chairman: J. Jacquemin
Members:
Engineers-leaders: Y. Grégoire, A. Smits
Engineers TAC: S. Eeckhout, L. Firket

Hygrothermy

Chairman: E. De Kempeneer
Members:
Engineers-leaders: X. Loncour, L. Vandaeye
Engineers TAC: A. Acke, P. Demesmaecker

Acoustics

Chairman: E. De Kempeneer
Members:
Engineer-leader: B. Ingelaere
Engineers TAC: V. Jadinon, S. Vercauteren

Company Management

Chairman: R. De Backer
Members:
Engineer-leader: D. Pirlot

Architects

Chairman: A. De Herde
Vice-Chairman: R. De Lathouwer
Members:
Engineers-leaders: M. Wagneur (until July 2009), P. Wouters, D. Langendries (as from July 2009)
Engineer TAC: D. Roofthooft

The work programme of the Technical Committees

Since 2008, the different Technical Committees have focussed on drafting a work programme giving an overview of the actions to which they wish to devote themselves during the following year.

These programmes bear not only on the dissemination of information (via Technical Information Notes, articles, courses, lectures, etc.), but also on the gathering of this information (studies, research, etc.).

At the end of October, all of the work programmes for the year 2010 were approved by the Standing Committee.
In order to successfully conduct its missions of research, development and information, the BBRI can rely on the knowledge and experience of more than 200 qualified staff members coming from a wide range of disciplines. This combination of professional skills, engagement and versatility has helped make the Institute the authorised body that it has become within its sector.

The BBRI does everything it can to improve quality in construction and strengthen the skills of construction professionals. This task isn’t an easy one, however, given the fragmentation of the process and the plurality of the actors.

In order to properly fulfil its mission and anticipate technological and societal developments, the BBRI can rely on a multi-disciplinary and dynamic team.

Our staff ensures that the results of the scientific and technical research conducted by the Institute benefit the greatest number.

The interaction between the experience and pragmatism of some staff members and the innovative visions of the others thus makes it possible to publish practical works, to provide technical advice as well as to organise courses and training sessions which correspond precisely to the needs of the sector.

Given the growing complexity of these needs and the increased efforts made in areas such as sustainable construction and renovation, finishing techniques, energy and indoor climate, ICT in construction or the accessibility of buildings, our staff expanded in 2009 to reach a total of 232 persons.
**Finances**

The accounting seeks to give an idea of the Institute’s financial situation and to motivate the decisions taken with regard to management.

**Affiliated Members**

On 31 December 2009 the BBRI had 79,470 members, including 51,320 one-man businesses. The graph below shows that this number increased by 20.4 % over the course of the past ten years.

If we take the index into account, the increase in fees collected for this period amounts to 22.5 %.

**Revenues and Expenditures**

The bar graphs at the top of the following page illustrate the evolution of the various revenues and expenditures relative to the total budget over the last three financial years.

One thus finds that the fees of the members represent some 55 % of the total revenues.

Personnel costs – the most important item of all the expenditures – fluctuated between 62 and 66 % over the past three years.

---

The graph below shows the evolution of the number affiliated members.
**DESTINATION OF THE EXPENDITURES**

The diagram presented below shows the revenues and the expenditures which result from the activities of the BBRI, after distribution of the structural expenses. The latter represent not only the costs relating to the buildings and equipment, but also the administrative costs.

This demonstrates that the totality of the available resources benefits, directly or indirectly, the construction companies. Indeed, if 91.6 % of the total budget is directly invested for the benefit of the sector, 8.4 % of that is valorised in research activities under contract which, in the long run, also benefit construction. Consequently, all of our resources are devoted to improving the quality and the competitiveness of the sector, which is ultimately the founding mission of the Institute.
During the meeting of the General Council of the BBRI on 28 April 2009, the composition of the General Council and the Standing Committee was approved as follows:

### General Council

<table>
<thead>
<tr>
<th>Role</th>
<th>Members</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chairman</td>
<td>Mr Jacques Gheysens</td>
</tr>
<tr>
<td>Vice-chairmen</td>
<td>Messrs Jan Coumans, Jacques De Meester, Vincent Favier</td>
</tr>
<tr>
<td>Honorary chairmen</td>
<td>Messrs Edmond Goes, Rob Lenaers</td>
</tr>
<tr>
<td>Members appointed by the Confédération Construction</td>
<td>Mrs Veerle Hofman, Messrs Jozef Aerts, Robert Brams, Pierre Crabbe, Philippe Crohin, Daniël Daniëls, Roland Debruyne, Patrick De Kinder, Jacques De Meester, Robert de Mûlenaere, Joseph Devilers, Staf Drooghmans, Lionel Eeckhout, Etienne Fleurinck, Jean-Louis Henry, Maximilien Le Begge, Marc Lefebvre, Jef Lembrechts, Frank Louwers, Claude Macors, Jos Mauriën, Jan Meuleman, Evans Meunier, Hendrik Mondeelaers, Léopold Ninnin, Gaëtan Peeters, Gilbert Pierrard, Leo Pype, Michel Swamen, Michel Therer, Thierry Toussaint, Henri Vanderlinden</td>
</tr>
<tr>
<td>Co-opted members</td>
<td>Mrs Hilde Masschelein, Mrs Christel Peeters, Messrs Vincent Favier, Yves Planet, Leon-Jozef Vancauwenberghe, Bruno Zanardini</td>
</tr>
<tr>
<td>Member appointed by the FEB</td>
<td>Mr Jan Coumans</td>
</tr>
<tr>
<td>Member appointed by the EMS, Independent Professions and Energy</td>
<td>Mr Gilbert De Neve</td>
</tr>
<tr>
<td>Member appointed by the Walloon Region</td>
<td>Mr Pierre Villers</td>
</tr>
<tr>
<td>Member appointed by the Brussels-Capital Region</td>
<td>Mr Jean-Claude Moureau</td>
</tr>
<tr>
<td>Member appointed by the Flemish Region</td>
<td>Messrs Dirk Otte, Leo Van De Loock</td>
</tr>
<tr>
<td>Members appointed by the employees’ organisations</td>
<td>Messrs Peter Börner, Guéric Bosmans, Patrick Franceus, Jan Staal</td>
</tr>
<tr>
<td>Account Inspectors</td>
<td>Messrs Staf Drooghmans, Léopold Ninnin</td>
</tr>
<tr>
<td>Statutory Auditor</td>
<td>Mr Jules Roebben</td>
</tr>
</tbody>
</table>

### Standing Committee

<table>
<thead>
<tr>
<th>Role</th>
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<td>Messrs Jan Coumans, Jacques De Meester, Vincent Favier</td>
</tr>
<tr>
<td>Members</td>
<td>Mrs Hilde Masschelein, Messrs Jean Biensmans, Daniël Daniëls, Robert de Mûlenaere, Philippe Gillion, Marc Lefebvre, Jan Meuleman, Jan Staal</td>
</tr>
<tr>
<td>Observers</td>
<td>Messrs Dirk Otte, Pierre Villers</td>
</tr>
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</table>
### Annex

**Online ‘Projects’ Database**

<table>
<thead>
<tr>
<th><strong>GEOTECHNICS &amp; STRUCTURES</strong></th>
<th><strong>CONCRETE &amp; CONCRETE STRUCTURES (SEQUEL)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>Règles de dimensionnement, d’exécution et de monitoring des systèmes de blindage traditionnels ou non</td>
</tr>
<tr>
<td>A2</td>
<td>SOIL MIX dans des applications constructives et permanentes. Caractérisation du matériau et développement de nouvelles lois mécaniques</td>
</tr>
<tr>
<td>A3</td>
<td>ENER-VIB – Vibration de profilis et transfert d’énergie (First DO.C.A)</td>
</tr>
<tr>
<td>A4</td>
<td>Stabilité des tranchées et des fouilles temporaires : effets de la non-saturation du sol</td>
</tr>
<tr>
<td>A5</td>
<td>TIS Speciale funderingstechnieken (Techniques spéciales de fondation) (IWT)</td>
</tr>
<tr>
<td>A6</td>
<td>AN Eurocodes</td>
</tr>
<tr>
<td>A7</td>
<td>TETRA – Conception de constructions résistant au feu</td>
</tr>
<tr>
<td>A8</td>
<td>AN Prévention du feu</td>
</tr>
<tr>
<td>B1</td>
<td>AN Eurocodes</td>
</tr>
<tr>
<td>B3</td>
<td>Application des BUHP dans l’industrie de la construction et de la préfabrication</td>
</tr>
<tr>
<td>B4</td>
<td>Cendres volantes pour béton</td>
</tr>
<tr>
<td>B5</td>
<td>Performances mécaniques du béton autocompactant : vers une application possible de l’Eurocode 2</td>
</tr>
<tr>
<td>B6</td>
<td>Analyse chimique des bétons et mortiers durcis</td>
</tr>
<tr>
<td>B7</td>
<td>Conception performantielle du béton exposé aux sulfates, compte tenu de la forme thaumasite de l’attaque</td>
</tr>
<tr>
<td>B8</td>
<td>BESLAG – Bétons à haute teneur en laitier</td>
</tr>
<tr>
<td>B9</td>
<td>BCC-BAT – Bétons légers chaux-chanvre projetables pour le bâtiment</td>
</tr>
<tr>
<td>B10</td>
<td>MORECAR – Modelling of Refractory Castable Rheology (Modélisation des propriétés rhéologiques du béton réfractaire)</td>
</tr>
<tr>
<td>B11</td>
<td>Application des Eurocodes pour une fiabilité harmonisée des structures secondaires</td>
</tr>
<tr>
<td>B12</td>
<td>Vers une normalisation des méthodes de calcul et d’essai du béton renforcé de fibres d’acier</td>
</tr>
<tr>
<td>B13</td>
<td>PROCIC – Systèmes de protection autocicatrisants</td>
</tr>
<tr>
<td>B14</td>
<td>GT Constructions multifonctionnelles à ossature mixte – OSSAMIX (SPW)</td>
</tr>
<tr>
<td>B15</td>
<td><em>TD Prestatiegerichte betonsoorten</em> (Bétons performants) (IWT)</td>
</tr>
<tr>
<td>B16</td>
<td>GT Mise en œuvre des bétons spéciaux (SPW)</td>
</tr>
<tr>
<td>B17</td>
<td><em>TD Nieuwe generatie gelijmde betonwapening</em> (Nouvelle génération d’armatures collées pour béton) (IWT)</td>
</tr>
<tr>
<td>B18</td>
<td>AN Bétons, mortiers, granulats</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>MASONRY &amp; FACADES</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
</tr>
<tr>
<td>C2</td>
</tr>
<tr>
<td>C3</td>
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<tr>
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<tr>
<td>C7</td>
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<td>C8</td>
</tr>
<tr>
<td>C9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>ROOFS &amp; LIGHT STRUCTURES</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>D1</td>
</tr>
<tr>
<td>D2</td>
</tr>
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<td>D3</td>
</tr>
<tr>
<td>D4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>JOINERY &amp; GLAZING</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>E1</td>
</tr>
<tr>
<td>E2</td>
</tr>
<tr>
<td>E3</td>
</tr>
</tbody>
</table>
### Annex

<table>
<thead>
<tr>
<th><strong>Joinery &amp; Glazing (sequel)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>E4</strong> Détermination économique des performances des fenêtres basée sur une utilisation collective des résultats d’essais</td>
</tr>
<tr>
<td><strong>E5</strong> AN Éléments de façade manuels et motorisés</td>
</tr>
<tr>
<td><strong>E6</strong> GT Nouvelles techniques de mise en œuvre des menuiseries (SPW)</td>
</tr>
<tr>
<td><strong>E7</strong> GT Le verre dans le bâtiment – BatiVer (SPW)</td>
</tr>
<tr>
<td><strong>E8</strong> GT Rénovation des bâtiments (SPW)</td>
</tr>
<tr>
<td><strong>E9</strong> TD Renovatie van gebouwen (Rénovation des bâtiments) (IWT)</td>
</tr>
<tr>
<td><strong>E10</strong> GT Eco-construction et développement durable en Région de Bruxelles-Capitale (IRSIB)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Wall and Floor Finishing</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>F1</strong> Aspect des matériaux de parachèvement : directives pour une procédure de mesure horizontale et des critères d’acceptation perceptuels</td>
</tr>
<tr>
<td><strong>F2</strong> Utilisation de la chaux dans le bâtiment : prescriptions et spécifications</td>
</tr>
<tr>
<td><strong>F3</strong> ETICS II – Enduits extérieurs : critères pour une durabilité améliorée (2e biennale)</td>
</tr>
<tr>
<td><strong>F4</strong> Evaluation des performances des revêtements de sol en bois collés : essais et spécifications</td>
</tr>
<tr>
<td><strong>F5</strong> GT Revêtements organiques – REVORGAN (SPW)</td>
</tr>
<tr>
<td><strong>F6</strong> TD Hygiène- en gezondheidsaspecten van materialen voor won- en werkrumten (Aspects sanitaires des matériaux dans les logements et les locaux de travail) (IWT)</td>
</tr>
<tr>
<td><strong>F7</strong> RETERMAT – Revêtements intérieurs à base de MCP pour une régulation thermique des bâtiments</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Sustainable Construction &amp; Renovation</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>G1</strong> GT Rénovation des bâtiments (SPW)</td>
</tr>
<tr>
<td><strong>G2</strong> TD Renovatie van gebouwen (Rénovation des bâtiments) (IWT)</td>
</tr>
<tr>
<td><strong>G3</strong> GT Eco-construction et développement durable en Région de Bruxelles-Capitale (IRSIB)</td>
</tr>
<tr>
<td><strong>G4</strong> CLEAR-UP – Clean and Resource Efficient Buildings for Real Life (Bâtiments propres et économiques en énergie en conditions réelles)</td>
</tr>
<tr>
<td><strong>G5</strong> CIMEDE – Constructions industrielles de maisons évolutives, durables et économiques</td>
</tr>
<tr>
<td><strong>G6</strong> Analyse des frais liés au cycle de vie (LCC) dans le cadre de l’évaluation des performances économiques des bâtiments durables</td>
</tr>
<tr>
<td><strong>G7</strong> Elaboration d’un modèle pour l’évaluation de l’accessibilité des établissements horeca, de leur sécurité incendie et de l’évacuation des personnes présentant un handicap</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Sustainable Construction &amp; Renovation (sequel)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>G8</strong> SUFIQUAD – Sustainability, Financial and Quality Evaluation of Dwelling Types (Evaluation de la durabilité, des coûts et de la qualité des différents types de logements)</td>
</tr>
<tr>
<td><strong>G9</strong> LEHR – Low Energy Housing Retrofit (Rénovation ‘basse énergie’ des logements)</td>
</tr>
<tr>
<td><strong>G10</strong> Elaboration d’un protocole d’essai visant à déterminer l’impact des matériaux de construction sur la santé</td>
</tr>
<tr>
<td><strong>G11</strong> EU-CHIC – Cultural Heritage Identity Card</td>
</tr>
<tr>
<td><strong>G12</strong> PERFECTION – Performance Indicators for Health, Comfort and Safety of the Indoor Environment (Indicateurs d’évaluation des performances de l’environnement intérieur en matière de santé, de confort et de sécurité)</td>
</tr>
<tr>
<td><strong>G13</strong> CONTEX-T – Architecture textile : structures et bâtiments de l’avenir</td>
</tr>
<tr>
<td><strong>G14</strong> Elaboration d’un référentiel pour le logement durable</td>
</tr>
<tr>
<td><strong>G15</strong> HEMICPD – Horizontal Evaluation Method for the Implementation of the Construction Products Directive (Méthode d’évaluation horizontale de l’application de la directive européenne sur les produits de construction)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Energy, Indoor Climate &amp; Installations</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>H1</strong> Q-DIRECT – Development of Referentials for Belgian Quality in Distributed Renewable Energy Concepts (Développement de procédures de qualité belges pour les systèmes d’énergie renouvelable)</td>
</tr>
<tr>
<td><strong>H2</strong> Q-DIRECT II – Development of Referentials for Belgian Quality in Distributed Renewable Energy Concepts (Développement de procédures de qualité belges pour les systèmes d’énergie renouvelable) (2e biennale)</td>
</tr>
<tr>
<td><strong>H3</strong> TD Duurzame bouwschil (Enveloppe durable) (IWT)</td>
</tr>
<tr>
<td><strong>H4</strong> RETERMAT – Revêtements intérieurs à base de MCP pour une régulation thermique des bâtiments</td>
</tr>
<tr>
<td><strong>H5</strong> CLEAR-UP – Clean and Resource Efficient Buildings for Real Life (Bâtiments propres et économiques en énergie en conditions réelles)</td>
</tr>
<tr>
<td><strong>H6</strong> LEHR – Low Energy Housing Retrofit (Rénovation ‘basse énergie’ des logements)</td>
</tr>
<tr>
<td><strong>H7</strong> Participation au développement de l’offre de formation sur la PEB en Région wallonne</td>
</tr>
<tr>
<td><strong>H8</strong> Développement de modules de formation pour les certificateurs énergétiques des logements existants en Région wallonne</td>
</tr>
<tr>
<td><strong>H9</strong> Accompagnement scientifique du développement du logiciel de certification énergétique des logements existants en Région wallonne</td>
</tr>
<tr>
<td><strong>H10</strong> SAVE-ASIEPI – Assessment and Improvement of the EPBD Impact for New Buildings and Building Renovation (Évaluation et amélioration de l’impact de la directive PEB pour les bâtiments neufs ou en rénovation)</td>
</tr>
<tr>
<td><strong>H11</strong> TETRA – Isolation des murs creux en rénovation</td>
</tr>
</tbody>
</table>
### Energy, Indoor Climate & Installations (sequel)

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>H13</td>
<td>Éclairage économe en énergie</td>
</tr>
<tr>
<td>H14</td>
<td>Soutien de la Région de Bruxelles-Capitale dans l’application de la nouvelle réglementation PEB</td>
</tr>
<tr>
<td>H15</td>
<td>Soutien de la Région wallonne dans l’application de la nouvelle réglementation PEB</td>
</tr>
<tr>
<td>H16</td>
<td>Soutien de la Région flamande dans l’application de la nouvelle réglementation PEB</td>
</tr>
<tr>
<td>H17</td>
<td>CODA-LIGHT – Energy Consumption of Control Systems and Daylight Access in Lighting Installations (Influence des systèmes sophistiqués de gestion de l’éclairage et de la lumière naturelle sur le calcul de la consommation énergétique)</td>
</tr>
<tr>
<td>H18</td>
<td>EPINS – Développement d’une méthodologie d’évaluation pour la caractérisation des performances énergétiques et du climat intérieur des produits de construction et des systèmes innovants</td>
</tr>
<tr>
<td>H19</td>
<td>Plateforme de concertation régionale concernant la réglementation PEB</td>
</tr>
<tr>
<td>H20</td>
<td>ECLOS – Étude et diminution des consommations d’éclairage dans les logements sociaux</td>
</tr>
<tr>
<td>H21</td>
<td>Collaboration aux activités du Air Infiltration and Ventilation Centre (AIVC)</td>
</tr>
<tr>
<td>H22</td>
<td>Q-INTAIR – Modelling Indoor Air Quality Based on Energy Performance and Ventilation of Dwellings (Modélisation de la qualité de l’air intérieur sur la base de la performance énergétique et de la ventilation des logements)</td>
</tr>
<tr>
<td>H23</td>
<td>Thermal bridges in the framework of the EPB regulations (Ponts thermiques dans le cadre de la réglementation PEB)</td>
</tr>
<tr>
<td>H24</td>
<td>Développement de la procédure de certification énergétique des logements existants en Région wallonne et extension de la Procédure d’avis énergétique aux immeubles à appartements</td>
</tr>
<tr>
<td>H25</td>
<td>Aide à l’implémentation du programme de rénovation énergétique flamand 2020 : élaboration d’une feuille de route pour les actions d’encadrement</td>
</tr>
<tr>
<td>H26</td>
<td>AN Energie et Climat intérieur</td>
</tr>
<tr>
<td>H27</td>
<td>GT Installations de climatisation et confort intérieur (SPW)</td>
</tr>
<tr>
<td>H28</td>
<td>TIS Groen Licht Vlaanderen : energiebesparing met beter licht (Groen Licht Vlaanderen : économies d’énergie et éclairage) (IWT)</td>
</tr>
<tr>
<td>H29</td>
<td>TD Innoklima – Innovatieve klimaattochten : integratie van energie-efficiënte HVAC-installaties in energiezuinige gebouwen (Techniques de climatisation innovatives : intégration des installations HVAC durables dans les bâtiments à faibles besoins énergétiques) (IWT)</td>
</tr>
<tr>
<td>H30</td>
<td>Practical Approach for Thermal Bridges 2010 (Approche pratique des ponts thermiques 2010)</td>
</tr>
</tbody>
</table>

### Acoustical Comfort

| I1 | Optimisation acoustique des constructions à ossature en bois |
| I2 | TIATAB – Towards an Integrated Acoustical and Thermal Approach of Buildings (Vers une approche acoustique et thermique intégrée des bâtiments) |
| I3 | Norme acoustique belge : critères |
| I4 | AN Acoustique |
| I5 | GT Acoustique (SPW) |
| I6 | TD Bouwakoestiek (Acoustique du bâtiment) (IWT) |

### Management, Quality & Information Technologies

| J1 | HEMICPD – Horizontal Evaluation Method for the Implementation of the Construction Products Directive (Méthode d’évaluation horizontale de l’application de la directive européenne sur les produits de construction) |
| J2 | Voluntary Arrangements for Collaborative Working in the Construction Sector (Mesures volontaires dans le but d’améliorer la collaboration dans le secteur de la construction) |
| J3 | SIMBA – Simulation multiphysique du bâtiment |
| J4 | Etude cadre intersectorielle des frais généraux d’entreprise |
| J5 | Support aux activités de la plateforme belge ‘Construction et innovation’ |
| J6 | Organisation d’un Roadshow en collaboration avec le SPF Economie sur le thème des moyens de développement économique dans le secteur de la construction |
| J7 | Vlaams Netwerk Toegankelijk Bouwen (Réseau flamand pour la construction accessible) |
| J8 | Centre de compétence ‘Construction durable’ |
| J9 | La gestion des risques dans la construction II – Mise au point d’un système de gestion des risques pour l’évaluation et le contrôle des facteurs de risque durant toutes les phases d’un projet de construction (2e biennale) |
| J10 | QUEST – Développement et gestion de systèmes de qualité pour des applications énergétiques renouvelables à petite échelle |
| J11 | GT Collaboration électronique dans le processus de construction (SPW) |
| J12 | TIS Intelligent bouwen (Constructions intelligentes) (IWT) |
| J13 | TD proKMO – Projectorganisatie voor KMO-bouwbedrijven (Organisation de projets pour les PME de la construction) (IWT) |
| J14 | TIS Bouwsoftwareplatform (Plateforme des logiciels de construction) (IWT) |
Carlo De Pauw | General Director (until July 2009)
Jan Venstermans | General Director (since August 2009)
Alain Billiet | Secretary General
Paul Carion | Head of Finance
Philippe Gosselin | Director Internal Education and Quality
Georges Klepfisch | Director External Relations for Standardisation and Certification
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