GREEN BUILDING: DEVELOPMENT WITH SUSTAINABILITY

Civil Construction Industry

INDUSTRY MEETING FOR SUSTAINABILITY
CNI – NATIONAL CONFEDERATION OF INDUSTRY – Brazil

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Civil Construction Industry

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The diversity of the national industry and the significant availability of natural resources reveal excellent opportunities for the sustainable development of Brazil, combining economic growth, social inclusion and environmental conservation. The materialization of concerns related to sustainability in the strategic agenda of enterprises and governments is a reality. Apart from isolated cases of success, the consequences of this attitude are felt in entire sectors of the economy. Further advances are still needed, but the path has already been identified and going back is impossible.

After coordinating an unprecedented critical thinking process on sustainability with 16 industry associations, the National Industry Confederation (CNI) delivers to the Brazilian society a wide range of information on progress, challenges and opportunities yet to come. The results presented here may not portray the significance of the discussion process experienced by the industry in preparing these documents. Developments on the process will be beyond the Rio +20 Conference, and are definitely incorporated on the daily lives of companies.

The subject of sustainability is inserted differently in each of the industrial sectors. However, some elements are common to all. The continuous pursuit for efficiency in use of resources and the need to increase industrial competitiveness are on the agenda of all the sectors. Encouraging innovation and scientific and technological development is strategic on the transition to more sustainable patterns of production.

Strategies to intensify actions coordinated internally in the industrial sectors and with governments and civil society organizations are no less important. The dissemination of sustainable practices by means of the supply chain and incentives for companies to undertake the role of integrated management of the territories are powerful tools.

The sectorial volumes developed by industry associations are valuable contributions to addressing subjects such as sustainability and competitiveness of domestic industry. One of the most representative results of this process will certainly be the strengthening of structured programs of action with a focus on promoting sustainability in the
production. These initiatives will act as raw materials so that the industries involved and CNI are able to systematically publish documents presenting the national industry’s developments towards the goals of sustainable production.

The documents presented here are intended to be a valuable contribution to enhance the debate on sustainability. Each of the sectorial associations is to be congratulated for their efforts.

Robson Braga de Andrade
President of the National Confederation of Industry – Brazil
Two decades after the Earth Summit – better known in history as Eco ‘92 – the world’s environmental conscience once again turns its attention to Brazil.

The 21st century’s agenda is marked increasingly by the commitment of international organizations, national governments, companies, and citizens to sustainable development. Few contemporary issues have sparked as much debate and consideration. The challenge before us is to reformulate outdated development paradigms and build a new economic order centered on the well-being of human beings, rooted in greater social equality and reduced environmental impacts.

Fully cognizant of this critical issue, Brazil’s construction industry has moved swiftly to shape the sector to these new economic parameters. And it is driven this spirit that the Brazilian Chamber of the Construction Industry (Câmara Brasileira da Indústria da Construção – CBIC) – the representative entity of domestic construction and real-estate companies nationally and internationally – developed a series of proposals in partnership with actors from civil society, academia, the construction supply chain, government, the Brazilian National Congress, and other sectors. The following pages synthesize this collection of ideas, with a view to stimulating sector policies and agreements to foster the consolidation of a new construction model in the country, one capable of integrating technological innovation, environmental sustainability, economic growth, and human development.

It is our view that the initiative could represent, within the framework of RIO+20, a significant Brazilian contribution to other developing countries confronted with similar realities to ours.

Paulo Safady Simão
President of the Brazilian Chamber of the Construction Industry – CBIC
The United Nations Conference on Sustainable Development, Rio+20, could not arrive at a more propitious time for the Brazilian civil construction industry. Boosted by solid growth in recent years and a promising future setting, the industry is moving to build on its latest gains through a sustainable strategy. To this end, it has promoted improvements in production processes, directed investments toward research and development, and encouraged sector policies tailored to align with government guidelines.

The measures adopted by the Brazilian civil construction industry strive to achieve a harmony with the green economy envisioned by the United Nations Environmental Programme (UNEP), centered on low carbon emissions, efficient resource use, and social inclusion.

Driven by the qualification and diversity of the participating actors, the Rio+20 Conference will provide a unique opportunity to secure positive strides in the development of realistic alternatives rooted in effective and harmonious solutions to overcome the socio-environmental challenges faced by the sector.

Civil construction has the potential to play a strategic role in Brazil’s economic growth and sustainability. The industry’s importance is reflected in its extensive supply chain and strategic position at the very heart of the effort to develop and improve the country’s infrastructure. However, civil construction’s developmentalist inclination, ingrained in the industry’s DNA, requires confronting a series of challenges relating to the environment, specifically widespread land occupation (and the consequent impacts on local characteristics), waste generation, natural resource extraction (for direct application in new projects), and the manufacture of inputs for construction activities.
The Brazilian Chamber of the Construction Industry (Câmara Brasileira da Indústria da Construção – CBIC) is the representative body of Brazilian construction and real-estate companies in the national and international spheres. Currently, the CBIC is composed of 62 entities and active in the country’s 26 states and the Federal District. It serves as a channel through the sector maintains ongoing dialogue with government agencies and civil society. The Chamber is tasked with formulating proposals to guide the supply chain.

In addition to heading the process in Brazil, the CBIC has had the opportunity to participate in coordinating the Construction Industry Sustainability Initiative (CISI) of the Confederation of International Contractors (CICA). The initiative develops platforms to help developing countries put in place integrated mobilization strategies for society, the supply chain, and government centered on sustainable construction.

The CBIC is also an active participant in the Inter-American Federation of the Construction Industry (Federación Interamericana de la Industria de la Construcción – FIIC). The entity created a permanent unit to foster collaboration between various Inter-American institutions dedicated to the transfer of research, development, innovation, and technology within the construction sector.

The CBIC’s priorities and programs are aligned with the global trend toward adoption of a green economic model. It is the Chamber’s view that through execution of the measures provided for in its programs the Brazilian construction industry can establish the necessary conditions to spur sustainable development in the country. To achieve its desired goal, a number of prerequisites must be met, including: valuing human beings, reducing environmental impacts in the supply chain, promoting building energy efficiency, ensuring rational water use, applying construction materials and systems capable of reducing natural resource consumption, and promoting urban development in harmony with the environment.

**PRIORITY CBIC AXES AND PROGRAMS**

- Infrastructure (Sanitation for Living Program – Programa Sanear é Viver);
- Social Interest Housing (Dignified Housing Program – Programa Moradia Digna);
- Professional Capacity Building (Next Step Program – Programa Próximo Passo);
- Technological Innovation (Technological Innovation Program – Programa Inovação Tecnológica-PIT);
- Sustainable Construction (Sustainable Construction Program – Programa Construção Sustentável-PCS);
- Innovation and Sustainability Park for the Built Environment (Parque de Inovação e Sustentabilidade do Ambiente Construído – PISAC);
The programs interact. Several of the proposals have a cross-cutting aspect (they extend through various segments of the sector and layers of society), leveraging dissemination of the related concepts and the outcomes of individual initiatives.

These programs are part of the CBIC’s strategy to partner with the Brazilian Government, industry, universities, the third sector, and other spheres of civil society. They also ensure the Chamber a prominent role in developing national and sector policies and in the construction of a sustainable Brazil.

The industry has mapped its key challenges in the short term, which include enhancing working conditions and professional qualification, reducing informality, increasing productivity through innovation, and – last but certainly not least – meeting the demands of society for quality, performance, and sustainability in the construction business.

The challenges of effecting this paradigm shift toward sustainable development offer opportunities to companies. Firms view this crossroads as a way to promote competitiveness by increasing the socio-environmental performance of their products and promoting enhanced technology and management solutions capable of boosting productivity, generating income, reducing costs, improving working conditions, and training professionals, in addition to fostering better relations with customers and the market.
Brazil is in the midst of a cycle of sustained growth and has before it an array of new investment opportunities moving forward, stemming primarily from major international events the country is set to host in the coming years, including the 2014 FIFA World Cup and the 2016 Summer Olympic Games. This growth period has been the product of direct State action, in particular since the 1990s when national strategies were redefined to secure significant advances toward economic stability and income distribution. Socioeconomic progress served to raise the population’s consumption standards and provide access to housing.

Since 2004, real-estate credit has expanded progressively in Brazil, leading to the construction and sale of new residential and commercial units. One of the principal factors behind this expansion was Law Nº 10931/2004, a milestone for the segment, which set forth new regulatory parameters for real-estate transactions. Among other improvements, the instrument bolstered legal security by introducing greater transparency and credibility. Through the new legal framework, the real-estate landscape was freed of obstacles, allowing for a vigorous growth trend. Ultimately, the law served the interests of all parties: consumers, construction companies, and credit/financing institutions.

In recent years, there has been a significant increase in real-estate financing in Brazil, with manifest social and economic repercussions: greater access by the population to home ownership and expanded civil construction activities, leading to job and income generation. From 2004, year in which the upward trend in real-estate financing credit began, through 2010, domestic civil construction rose 42.4%. This translates into an average annual growth rate of 5.18% over the same period. Similarly, the number of units financed with resources of the Brazilian Savings and Loan System (Sistema Brasileiro de Poupança e Empréstimo – SBPE) between 2004 and 2011 climbed more than nine times, from 54,000 to 493,000 properties out of a total of almost two million residences in the period.

Sustaining the civil construction industry’s growth requires moving forward with the projects provided for under the Growth Acceleration Program (Programa de Acelera-

2 ECONOMIC AND SOCIAL SETTING
cão do Crescimento – PAC) and the National Logistics and Transportation Plan (Plano Nacional de Logistica e Transportes – PNLT) and to continue long-term implementation of the social housing policies established in the My Home, My Life Program (Programa Minha Casa, Minha Vida). If executed as planned, these initiatives will give effective expression to the State’s commitment to a future capable of addressing existing constraints on Brazilian growth and reducing social inequality.

Launched in 2007 by the Brazilian Government, the PAC’s core purpose is manifest in its very designation: to promote accelerated economic growth in Brazil. The Program provides for a set of coordinated measures to improve the domestic investment setting, in order to stimulate credit and financing, streamline and enhance the tax system, in addition to allowing for long-term fiscal adjustments.

In 2010, the PAC’s second stage was rolled out. The investments in the first two stages exceed two trillion reais, a substantial portion of which is allocated to infrastructure projects, urban development initiatives, and real-estate financing credit. Unveiled in 2009, the My Home, My Life Program is the product of a partnership between the Federal Government and the construction industry aimed at transforming the dream of millions of Brazilians for a home of their own into a reality. The Program provides for the construction and purchase of new housing units – and in some cases the reclassification of urban properties – for families with monthly incomes up to R$ 5,000.00. It is at its core a civic initiative that will spur the contracting of three million new homes through 2015. My Home, My Life has a strong social inclusion component and has bolstered the residential construction segment for low-income Brazilians. While accelerating industrial growth, the Program has boosted quality of life for a significant portion of the country’s population – in short, it reflects the characteristics of a successful inclusive economy.

**FIGURE 1. CIVIL CONSTRUCTION IN DECEMBER 2011**

![Diagram showing civil construction in December 2011 with data on projects contracted and delivered through October 2011.](image-url)
2.1 Construction supply chain

Civil construction – also denominated the construction sector or construction industry – encompasses a complex and heterogeneous supply chain composed of a variety of business interests and activities involving multiple social agents, in addition to a wide range of products and services.

As an industry, civil construction centers on managing the activities associated with the execution of building, road infrastructure, water, industrial system, and urban development projects, among others.

The civil construction industry is made up at its core of construction companies, developers, service providers, and suppliers representing a diversity of manufacturers and retailers of the construction materials and equipment segment. In addition to these core components, industrial complexes engaged in supplying the necessary inputs for production are also a part of the civil construction supply chain.

2.2 Economic aspects

The decision to stimulate the domestic market and, at the same time, address longstanding bottlenecks in infrastructure – logistical, social, and urban – has served to place civil construction at the center of economic activity. A number of measures adopted in recent years help explain the evolution of the current setting.
Beyond a stable macroeconomic setting that allows for key economic variables (interest rates, currency exchange, price and cost stability, income growth, etc.) to be forecast with a considerable degree of confidence, the current business environment boasts clear rules associated to the consolidation of positive expectations for the future. The CBIC’s work has been – and remains – a decisive factor for sustaining the favorable landscape.

Civil construction has answered the call to become a principal driver of the new cycle of domestic growth. There is broad consensus that selecting the construction industry to serve as a driver of an economy that remained “depressed” over a long stagnant period defined by high inflation was the right decision. The construction supply chain, in conjunction with government action, has responded to the need to spur the Brazilian economy and produced social and economic effects far beyond anything that could have been hoped for from a segment deemed “dead in the water” for so long.

This evolution toward a healthier economic environment is due to the reciprocal commitment of government and the construction supply chain to engage in continuous action and investment initiatives. It is essential that this mutual commitment be maintained. For discontinuing the related policies would have the effect of dismantling positive expectations – thereby preventing investments made in the supply chain from maturing – and discouraging new investments, ultimately jeopardizing the continued success of the current virtuous cycle.

The construction segment in Brazil is characterized by low consumption of imported inputs across its vast supply chain. As such, it has little impact on the country’s balance of payments and serves to stimulate other domestic industries, making it a strategic sector in periods of slower economic activity.

Even in the midst of the 2008 international financial crisis, the housing credit expanded and registered its highest growth ever in 2009. This indicates the fundamental importance of ensuring the stability of the real-estate credit market given its anti-cyclical role, to the extend a long cycle of production contributes to reducing the impact from short-term oscillations in economic activity.

The construction industry is the central component of a larger macro-sector, stimulating segments ranging from raw material extraction to project financing and maintenance services. Data from 2009 reveal that the civil construction macro-sector accounts for 15.6% of Brazilian GDP. For its part, the housing sector is the segment’s largest component, corresponding to 73.45% of the total.

Currently, it is estimated that the domestic construction industry represents 8.1% of GDP and provides employment to more than 11.3 million workers – slightly more than 70% of the macro-sector’s total – offering some perspective on the sector’s sheer strength.

The construction industry is an important investment channel in Brazil, encompassing infrastructure projects – roads, airports, sewage systems –, schools, hospitals, homes, residential and commercial buildings, factories, and maintenance and renovation projects. In 2010, the sector accounted for 37.8% of total Fixed Capital Formation in Brazil. These resources are critical to resolving the strategic bottlenecks facing the nation’s infrastructure and to lay the foundation for Brazil’s economic development.
The largest share of income in the construction industry – 65% or R$ 193.59 billion – is held by the self-management and self-built segment, in addition to construction companies engaged in executing specific works or project phases within the scope of larger engineering projects. These segments largely determine the pace of activity for the remaining links in the supply chain. The construction materials industry is second in terms of the value-addition contributed to the supply chain: estimated at a total of R$ 46.2 billion, or 15.5% of the supply chain’s output, and a workforce of 680,000, according to 2010 data.

With respect to job creation, the sale of construction materials – represented by the wholesale and retail sale segments – is the macro-sector’s second leading component, employing 819,100 workers. The value addition of the construction materials retail and wholesale segment was R$ 20.93 billion, or 7.0% of the total supply chain, according to 2010 figures.

Service provision activities encompass development projects, the purchase and sale of properties, machinery and equipment rentals, and technical services, such as engineering and architectural designs. In 2010, these activities generated R$ 18.3 billion in business, a full 6.1% of the supply chain’s total output, and accounted for 4.3% of all jobs, or 483,000.

### 2.3 Social aspects

Civil construction in Brazil plays a relevant social role due to its significant capacity to create jobs. The industry maintains a symbiotic relationship with population growth, given the continuing need for new housing. In addition, the sector is at the forefront in the effort to address Brazil’s long-standing housing shortage and inadequate access to basic sanitation.
As a labor intensive industry, construction has accounted for a large share of job hiring in recent years. Job growth has been accompanied by an increase in formal employment, as reflected in the substantial rise in the number of workers with employment cards. From December 2004 through December 2010, formal employment levels in the construction industry climbed 139.34%, or 13.28% per year, leading to the incorporation of an additional 1.46 million workers in the formal job market.

The figure is all the more impressive when compared to previous periods, from 1986 through 1989, only 219,000 formal jobs were created in the civil construction industry. In the following decade, specifically 1990-1999, the number of formal jobs in the sector actually fell by 30,4001.

The industry provides opportunities for incorporation in the unskilled labor market. At the same time, there is clearly a need to invest more in worker training and education. Currently, job openings in the construction sector must compete with other economic sectors and government assistance programs.

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1 The study was performed by SINDUSCON-MG based on information from the Annual Registry of Social Information (Relação Anual de Informações Sociais – RAS) of the Ministry of Labor and Employment.
In regard to job creation, a limiting factor involves the execution time for projects, which runs slightly more than several months, in general, an intrinsic characteristic of the market, resulting in high turnover rates—hiring followed by layoffs (and vice versa) over the short term.

Civil construction performs important functions in the national effort to reduce the country’s housing shortage, an historical deficit which has been addressed in conjunction with government measures in recent decades (My Home, My Life).

Closing this gap will bring substantial social benefits, in particular given that the effort is directed at low-income segments. In addition to the positive social effects of the key activities carried out by construction companies, there has also been a strong push toward promoting Corporate Social Responsibility (CSR) in the industry, as reflected in a 2010 study conducted by the CBIC. The survey revealed that the concept of CSR has taken on increased strategic importance for the sector, with almost 60% of all companies responding that they had implemented initiatives to this end.

Social responsibility is no longer viewed as a mere voluntary contribution by the private sector to compensate for the omission and inefficiency of public policies. In the survey, companies indicated their desire and intention to boost investments in education, health, and environmental sustainability. The diagnostic study has served as a valuable tool for the efforts of CBIC’s Social Action and Citizenship Forum (Fórum de Ação Social e Cidadania).

2.4 Challenges for the development of the civil construction industry

The development of the Brazilian construction industry has been impacted indirectly by the global recession and directly by Brazilian government investments in housing, infrastructure, and transportation.

The State has a decisive role in the sector’s performance through the incentives it provides to regulatory actions, the reduction of red tape, and access to credit. To spur its competitiveness, irrespective of external or internal factors, the civil construction industry must:

• incentivize formality within the sector;
• promote technological changes in construction processes and materials, taking into account rational resource use, at the expense of more costly and polluting production technologies and methods;
• increase the use of machinery and equipment;
• attract and train the workforce entering the construction market and provide capacity building to existing workers in the use of new technologies and products; and
• identify new funding sources for production and consumption.
With respect to government programs, in addition to new housing, investments need to be channeled to sanitation, transportation, energy, and communication infrastructure, and to provide for the orderly/planned growth of existing urban centers.

The transportation sector estimates that investments of R$ 290 billion will be required from 2008 through 2023. For its part, the sanitation segment has projected that investments of more than R$ 206 billion will be needed to ensure universal access through 2022.

Effective partnerships between government and industry – such as the My Home, My Life Program – must be continued. According to data of the Getúlio Vargas Foundation (FGV), the first stage of the My Home, My Life Program has resulted in investments of approximately R$ 39.5 billion. Further, the initiative generated almost 300,000 jobs and more than 229,000 in other segments of the supply chain. The program extends to every region in the country, decentralizing investments and promoting the growth of a diversity of localities. Initiatives such as this one are critical to maintain the sector’s upward trend and lay the groundwork for the establishment of a green economy in Brazil.
In the wake of the Montreal (1972), Rio de Janeiro (1992), Kyoto (1997), and Johannesburg (2002) conventions, the goal of sustainable development has drawn a rising global commitment and recognition. There is a consensus today on the need for sustainable strategies for integrating environmental concerns in development plans and policies. Agenda 21, unveiled at Eco-92, continues to serve as a central reference of the integration process. To be sure, the document’s long-term outlook represents an ambitious global plan to strike a balance between socioeconomic needs and the planet’s natural resources.

Over the past twenty years, society has moved to apply Agenda 21, specifically in local and sector contexts. Public policies have begun to include environmental requirements in a variety of economic activities, leading to increased demand for more environmentally friendly products. Environmental preservation has come to be viewed over these two decades as an additional production value.

For the civil construction sector, there are three relevant aspects to Agenda 21.

- The first is the Habitat II Agenda, signed at the 1996 United Nations Conference in Istanbul. The document outlines a practical plan with sustainable development approaches and strategies for urban areas across the planet. Its two key objectives are the supply of adequate housing for all people and the construction of sustainable settlements in an urban world.

- The second is the 2000 CIB Agenda 21 on Sustainable Construction, which provides for impact reduction measures through changes in building design, construction, and management over time. Agenda 21 for Sustainable Development sets out the environmental impacts generated throughout the supply chain, from building design through demolition. Yet, it also points to the major (albeit overdue) shift in consciousness beginning in the last decade of the 20th century, which prompted a series of systematic studies with measurable results, including, for instance, reduced energy loss and recycling.
Additionally, within the framework of the CIB/UNEP the 2002 Agenda 21 for Sustainable Construction in Developing Countries was crafted, which represented a significant step forward in relation to the document described above by centering on the realities of developing countries and their specific challenges.

The environmental agenda lays out guidelines for sustainable development policies that should be addressed by governments in the public policy-making process and the private sector, as well. On this front, the United Kingdom offers a prime example of the development of a successful environmental agenda, reflected in the 1999 publication A better quality of life – a strategy for sustainable development for United Kingdom (DETR, 2000).

Based on this initiative and CIB’s agenda, in 2000 the UK’s Department of the Environment, Transport and the Regions (DETR): London prepared an environmental agenda for the civil construction industry. In 2003, the DETR published its first activities report, in which it set out the results achieved in the period 2000-2003.

Presentation of the results is first accomplished through a report of all activities undertaken, followed by consideration of the activities executed, including performance evaluations of different variables corresponding to the work performed. The analysis is divided into individual components, such as legislation, awareness-raising, business feasibility studies (economic and environmental outcomes), dialogue with the parties involved, the dissemination of good practices and establishment of goals, and the creation and measurement of indicators.

The initiative has enabled the United Kingdom to build an organized technological structure within the supply chain over the years aimed at providing sustainable solutions. DETR has also contributed to the formulation of public policies and regulation to consolidate a favorable environment capable of allowing companies to adapt to the changing landscape. It has also played an important role by establishing reference points for society aimed at increasing public understanding of what sustainable construction is.

Another set of actions which has provided direct support to sustainable development in the construction industry involves the introduction of building environmental certifications, which set forth the parameters for assessing the environmental impacts of buildings at the time of their construction and subsequent use. Many developing countries have developed methodologies intended to support the activities of construction companies in their respective markets.

In 1990, Britain’s Building Research Establishment (BRE) issued the world’s first sustainable building certification method, known as the Building Research Establishment Environment Assessment Method (BREEAM). Currently, more than 200,000 buildings are BREEAM certified. In the mid-1990s, the Leadership in Energy and Environmental Design (LEED) was developed in the United States by the U.S. Green Building Council (USGBC). Through 2011, approximately 32,000 certifications had been issued worldwide. Both building environmental assessment methods offer good design and management guidelines. A number of other systems have evolved in different countries, such as the CASBEE method in Japan and the HQE model in France.
All of these methodologies give special emphasis to energy efficiency during the lifespan of buildings, initially focusing on commercial and service structures. The concern with energy efficiency is due to the impact of high energy consumption, primarily in the Northern Hemisphere.

The evolution of these assessments is reflected in the development of methodologies for residential buildings and sub-divisions. This has served to expand the concept of sustainable construction to include other types of projects and to introduce additional energy efficiency requirements as well as social considerations in the respective assessment procedures. In short, the concept of green building has been transformed into the concept of sustainable building.

The advantage of environmental assessments is that they trigger a reaction along the supply chain involving designers in the development of project designs aligned to the concept of and search for sustainable construction materials and systems. Sustainability, in this context, is understood to encompass not only the environmental performance of products, but the socio-environmental responsibility of manufacturers as well.

There is still much to be done. Among the remaining objectives are: the development of product and building lifecycle analyses (for the purpose of ensuring the desired performance), in addition to a mechanism for informing end consumers of the socio-environmental characteristics of products and construction works, and the sustainable aspects of individual projects.
3.1 The evolution of sustainable construction in Brazil

Sustainable construction in Brazil has been structured on the basis of three major pressure points: government regulation, the need to respond to environmental impact outcomes, and the demands of different market actors and the third sector.

In addition to consumers, an increasingly active civil society has emerged to push the debate on sustainable development and prepare studies and mechanisms aimed at pressuring companies to review their practices, with a view to obtaining positive and balance returns for all the actors involved.

In Brazil, a number of drivers have awakened the civil construction industry to the need to develop research, technology, and capacity building geared to the environment. Among these was the severe energy shortage of 2001, more commonly known as the “blackout”; the question of water rationing in metropolitan areas in 2002-2003; and the approval of National Environmental Council (Conselho Nacional do Meio Ambiente – CONAMA) Resolution Nº 307 of July 2002, governing waste management in civil construction activities.

In addition to these factors, below we offer a brief overview of several priority issues currently addressed within the scope of government programs and civil construction sector initiatives:

- quality and productivity;
- construction and demolition waste;
- energy efficiency;
- rational water use;
- construction materials and systems;
- responsible timber use;
- building environmental assessments; and
- sustainable consumption.

Quality and productivity

In recent years, socio-environmental questions have been incorporated in government programs aimed at improving the quality and productivity of construction activities. The Qualihab (1996), a project quality assessment system developed by the São Paulo state government, endeavors to ensure the most balanced expenditure approach possible to human resources, materials, and energy (water/power) in residential construction projects, with a view to environmental preservation.
Based on this view, Qualihab incorporates practices aimed at enhancing productivity and reducing waste, while serving as a foundation for the Brazilian Habitat Quality and Production Program (Programa Brasileiro de Qualidade e Produtividade no Habitat – PBQP-H), a nationwide program coordinated by the Ministry of Cities.

The PBQP-H is a Brazilian government instrument intended to ensure fulfillment of the commitments undertaken in the Istanbul Charter (Habitat II Conference/1996). Its goal is to organize the civil construction sector around two key questions: improved habitat quality and the modernization of production.

The actions provided for in the PBQP-H include the Conformity Assessment System for Civil Construction Services and Projects Companies (Sistema de Avaliação da Conformidade de Empresas de Serviços e Obras da Construção Civil – SiAC). SiAC, which replaced the former Qualification System for Services and Projects Companies (Sistema de Qualificação de Empresas de Serviços e Obras – SiQ), strives to contribute to the development of quality in the construction industry through conformity assessments of the management systems of companies engaged in construction-related service provision and projects.

The March 2005 version of SiAC requires construction companies to identify and determine the appropriate disposal of solid and liquid waste produced in construction sites (débris, sewage, and waste water), with a view to protecting the environment during the planning and execution of projects.

**Energy efficiency**

The 2001 “blackout” prompted Brazil to question if its energy grid – the array of sources capable of supplying electric power in a safe and reliable manner – was scaled to meet current and future demand. The country was forced to face up to the reality that the large majority of its energy sources derived from hydroelectric plants. This led to the need to identify alternative sources of power generation – solar, wind, biomass – with lower environmental impacts.

In addition to investments in power generation, the “blackout” brought to the fore the effort to address increased energy efficiency from the consumption end. In this way, the incentive to rational energy use and the development of reduced energy consumption devices and equipment became the subject of a strategic review.

Aware of the need to adopt measures in the energy field, in 1985 the Brazilian government created the National Electric Power Conservation Program (Programa Nacional de Conservação de Energia Elétrica – PROCEL), for the purpose of rationalizing electric power production and consumption in commerce, sanitation, education, industry, buildings, public establishments, municipal management processes, and public lighting. In 1991, PROCEL was transformed into a government program with energy reduction targets to provide for planning of the electric power sector. This enabled proper scaling of electric power supplies.
According to PROCEL data, in Brazil residential, commercial, and public buildings historically accounted for 48% of all electric power consumption. There was traditionally no concern for rational electric power use, an issue that should have been considered in the design, project execution, and utilization stages. Another relevant measure was the launch of the PROCEL Seal granted annually since 1994 for equipment containing the highest levels of energy efficiency in their respective categories. The PROCEL Seal stimulates domestic manufacture of more energy efficient products and provides guidance to consumers at the time of purchase on the equipment most suited to a green economy. The instrument directly impacts consumers, as well as the construction industry. For the purchase of equipment bearing the seal – refrigerators, freezers, air conditioners, light bulbs, etc. – enables substantial reductions in energy consumptions in buildings.

The PROCEL example demonstrates that coordinated measures allow for the execution of environmental actions in a broad and rational manner. In other words, even in buildings designed and built on the basis of energy efficiency concepts, desired environmental benefits cannot be achieved if consumers are not given the option to use appliances which are consistent with those concepts.

Driven by the evidence of civil construction’s trend toward continued expansion in order to meet the country’s elevated housing shortage, in October 2003 ELETROBRÁS launched the PROCEL – Building Program (Procel – Edifica). The idea of the initiative is to disseminate the concept of Building Energy Efficiency (BEE) among professionals involved in building design and construction as a way to incentivize measures to reduce wasteful electric power use in residences, public buildings, shopping centers and malls, hotels, and related establishments.

PROCEL – Building is a multi-sector initiative coordinated among various entities in the fields of government, technology, economics/finance, and development. This has enabled the effort to set out targets for the development of projects relating to:

- reduced electric energy consumption in buildings;
- measures for rational electric power consumption;
- dissemination of energy efficiency concepts in buildings, including incorporation of bioclimate architectural concepts;
- dissemination of renewable energy use;
- utilization of more efficient technologies in projects, equipment, and manufacture of construction materials;
- awareness-raising for professionals on the possibility of influencing city planning efforts, project designs, and the construction of efficient buildings;
- development of technical manuals, including the review of existing publications;
- support to the execution of demonstration projects; and
- dissemination of good practices in projects and constructions that introduce the concepts of environmental comfort and energy efficiency.
In 2009, PROCEL – Building launched a seal for commercial, service, and public buildings and in 2010, for residential buildings. The program, which is currently voluntary, will be mandatory as of 2020, initially in commercial, service, and public buildings, pursuant to the National Energy Efficiency Plan, approved by the government in 2011.

The program has been further strengthened through new financing lines from the National Economic and Social Development Bank (Banco Nacional de Desenvolvimento Econômico e Social – BNDES) allocated to the construction or renovation of hotels. The increase in credit lines to hotels is part of the effort undertaken to meet the demand generated by the major sporting events scheduled to held in Brazil through 2016 and expansion of the country’s tourism industry.

**Rational water use**

The water shortages of 2002 and 2003 that forced water rationing measures on the population of São Paulo also contributed to inserting the environmental question in the civil construction sector. The debate on rational water use stimulated the adoption of measures through the Brazilian Quality and Productivity Program, including Sector Plans on the Quality of Earthenware and Metals (Planos Setoriais da Qualidade de Louças e Metais – PSQs), which spurred the development of equipment, such as lavatories, capable of reducing consumption by as much as 60%.

In addition to the factors described above, we provide a brief overview below of the priority issues addressed by the construction industry to date, including materials, building environmental assessments, climate change, solid waste, natural resources use, such as timber, and sustainable consumption.

**Construction and demolition waste materials and debris**

Approved in 2010, the National Policy on Solid Waste (Política Nacional de Resíduos Sólidos) governs the management of construction waste through the application of distinct rules from those imposed on industry in general but similar to those regulating urban solid waste. The majority of the waste generated by the sector in cities derives from renovation and self-building activities – nearly 70% of the total volume. Managing this waste requires integrated measures between municipal governments and the private sector and society.

CONAMA Resolution Nº 307 of 2002 was recently amended by Resolution Nº 448 of 2012, which updated the guidelines based on the National Policy on Waste (Política Nacional de Resíduos) and established timetables for municipalities to develop waste management rules for small and large generators alike.

In Brazil, the industrial sector began to mobilize on the question of waste ten years ago. In that time, capacity building in the proper management of project sites have been offered throughout the country. Construction companies have come to understand that
the concepts of “no waste generation,” “proper separation,” and “environmentally appropriate disposal” provide benefits to projects. In addition to reducing waste, which leads to lower disposal costs, the focus on proper management of work sites has been reflected in more organized projects, improved cleanliness, and, ultimately, fewer workplace accidents.

The supply chain has studied the possibilities of reusing and recycling waste and the development of business opportunities relating to recycling. An example of this is the use of recycled materials in paving/asphalting projects in municipalities, sparking interest among private sector firms in the implementation of inert waste recycling operations. However, greater effort is still required to identify solutions for other types of waste to meet the demands of reverse logistics now taking hold in the country.

By virtue of the National Policy on Solid Waste, resources have begun to be channeled to financing lines for municipalities and the private sector for the purpose of: (1) developing waste management plans, (2) equipment purchases, and (3) implementing transshipment, sort, and recycling areas.

The National Industrial Waste Plan, which will be executed under the National Policy upon completion, will outline targets for eliminating improper waste disposal by 2014, a step that will benefit cities and reduce irregular disposal practices, while preventing flooding and vector proliferation. Additionally, it will provide for measures to reduce waste generation and boost recycling in projects.

**Climate change**

A number of public policy initiatives have placed construction at the forefront of environmental questions. Approved in 2009, the National Policy on Climate Change (Política Nacional de Mudanças Climáticas) identified the construction industry as a priority in the reduction of greenhouse gas emissions and the adaptation of built environments to climate impacts.

With respect to emissions, the focus is to work with the materials, systems, and equipment segments, in order to reduce emissions in the manufacturing process. On the question of the adaptation of built environments, an effort is underway in several cities to map vulnerabilities arising from climate impacts in urban centers, with a view to identifying risk areas subject to flooding and landslides.

The data will enable public managers to develop short-term plans for addressing the respective effects. In addition to measures relating to imminent risks, other aspects have begun to be considered in the urban planning process, including the reduction of heat islands, improved transportation, and others. The role of civil construction in this context is clear, given the imperative for sanitation and infrastructure projects, ranging from communication services to energy and transportation systems.
Construction materials and systems

The sector has sought to develop sustainable technologies and materials. The participation of industry representatives in trade fairs (construction and decoration) has increased over time, offering construction and interior design solutions, including recyclable carpeting, toxic solvent-free paints, etc. Consultations with suppliers over time revealed the difficulty of producing these materials at scale, impeding more widespread utilization and resulting in higher costs. However, the market for these products and services continues to follow an upward trend, primarily by virtue the construction sector’s increased engagement in environmental questions.

With expanded environmental consciousness, architects/designers have been pushed to select more environmentally-friendly materials. Unfortunately, some manufacturers take advantage of a persisting general lack of knowledge, resorting to greenwashing, a tactic that involves highlighting sometimes insignificant and irrelevant aspects of products to induce consumers into making poor choices. Some manufacturers voluntarily seek out “ecological seals.” These assess products on the basis of the environmental impacts stemming from natural resource extraction through final disposal by means of on-site inspections, lifecycle assessments, tests, and data collection. In this way, manufacturers spontaneously attest to the environmental performance of their business operations. In regard to environmental questions, product and building lifecycle assessment studies are at the same stage of development in Brazil as in the most developed countries.

Building environmental assessments

In 2007, the first environmental certification was issued for a building in Brazil based on the LEED methodology. Although widely disseminated and more prevalent in the world, BREEAM was not used for a building certification in Brazil until 2010. In the light of the criticism that these methods failed to reflect Brazilian realities, the AQUA certification, an adaptation of the French HQE system, which takes into account social questions, was introduced in 2010.

By virtue of its capacity to drive the financing sector, in 2010 the Federal Savings Bank (Caixa Econômica Federal) introduced the Cixa Casa Azul Seal (Selo Casa Azul Caixa) to promote innovation and the construction of more sustainable housing. The Bank’s initiative represents a project sustainability classification system adjusted to housing construction realities in Brazil. The seal is a voluntary instrument available to all housing projects submitted to the Bank. The objective is to recognized good practices by companies in sustainable construction. The Savings Bank provides incentives to the use of solar heating systems in social interest housing. The result is lower utility bills for residents and potentially more money in people’s pockets. The initiative merges environmental and social practices.
Building certification has drawn the interest of industry businesses. The largest number of LEED certifications goes to high-end commercial projects. As such, these meet the needs of international investors and companies seeking offices for their operations which offer added environmental quality. A majority of these projects are centered in Brazil’s Southeast Region. However, companies in other regions have begun to adopt these concepts. There are also examples of projects for the 2014 FIFA World Cup and the 2016 Summer Olympic Games focused on these concerns. For instance, a number of football stadiums currently under construction or renovation for the World Cup have sought LEED certification.

The search by construction companies and developers for certifications has been a spontaneous phenomenon. For the market views certification as a value-added instrument for the product. The costs arising meeting the requisite sustainability criteria are easily absorbed in the case of high-end projects. Moreover, the appeal of classification as a sustainable building boosts the interest of potential buyers, while fostering the perception that environmental responsibility influences the decision-making process, thereby accelerating the sale of new constructions. Companies have started to understand that joining their brand to socio-environmental initiatives generates returns in the form of enhanced image.

By virtue of the media’s clamor for sustainability, civil construction industry customers have manifested interest in more sustainable projects. This has spurred companies not yet focused on certifications to adopt good practices, including measures to reduce water and energy consumption, improve environmental quality of commercial and residential units, and incorporate sustainable materials in their projects. The reality of customers highly attuned to and aware of the “green economy” – a market factor that has driven construction companies and developers to adjust their strategies – is here to stay and demands that companies quickly develop the skills and capacities to meet this paradigm shift.
Responsible use of timber

The construction industry is one of Brazil’s primary timber consumers. A recent study by WWF found that timber is used principally in construction projects to implement underlying structures and foundations for buildings. In other words, the use of timber is by and large temporary. In general, these activities rely on timber extracted from planted forests, including pine and eucalyptus, as well as processed wood sheets. The use of native timber from the Amazon forest is more common in floors, deck, and roofs, that is in applications permanently incorporated to projects.

The study also revealed that construction companies can exercise influence through their purchasing power to avoid using illegal or predatory timber. And to be sure, the industry has focused increasingly on acquiring timber from secure sources. Through the Brazilian Institute for the Environment and Renewable Natural Resources (Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis – IBAMA), the Brazilian government has strengthened registration procedures for producers, resellers, and consumers, in addition to transportation oversight and inspection efforts.

In 2009, the Federal Savings Bank sponsored the Legal Timber Program (Programa Madeira Legal), as a means to support IBAMA’s efforts. The initiative requires proof of origin documentation for timber in projects funded by the Bank. Certified timber producers have identified the expansion of the domestic civil construction sector as a potential offset to falling demand in the United States and the European Union. Accustomed to supplying the external market, these companies are betting domestic consumption will be able to absorb some of their inventory. NGOs and entities engaged in incentivizing the use of certified timber have endeavored to ensure the construction segment begins to require certification of timber products. However, there is still a need to more carefully consider the question of timber supplies, often unavailable in the forms most commonly employed in domestic construction activities.

Sustainable consumption

The Action Plan for Sustainable Production and Consumption (Plano de Ação para Produção e Consumo Sustentável – PPCS), coordinated by the Brazilian Ministry of the Environment, is aimed at fostering sustainable consumption and production policies, programs, and measures in the country.

On the one hand, sustainable production is based on promoting positive socio-environmental impacts during the entire lifecycle of products and services. On the other hand, sustainable consumption is based in purchasing decisions that include, in regard to product or service selection procedures, environmental and social criteria. Therefore, choices are no longer simply about price, but involve product environmental impact assessments spanning the useful life of products and fulfillment of the applicable legal and social responsibility requirements.
The PPCs involves initiatives aimed at solving socio-environmental challenges, consistent with national policies to eliminate poverty, reduce greenhouse emissions, and promote sustainable development. The plan fosters a shift in production and consumption patterns and identifies six areas of activity, among them sustainable construction.

The concept of sustainable construction has introduced a new mentality to the civil construction industry, which increasingly has committed to the principles of the “green economy” and willing to adopt practices to enhance socio-environmental performance. This paradigm shift in the market has extended from the design stage to effective construction, and included careful selection of materials and solutions capable of reducing impacts to the environment and human health.

The goal through 2020 is to ensure all projects register environmental performance levels 20% current rates, as measures by a series of indicators on water consumption, energy, waste generation, and socio-environmental performance of purchased products. Retail establishments and final consumers are key targets of the PPCs. Measures such as these contribute to disseminating sustainable construction principles for society and involve a slice of the self-building and building renovation market.

3.2 Outlook for sustainable construction

Sustainability remains in the awareness-raising stage within the Brazilian civil construction sector. However, it is clear that environmental questions in the country are inextricably tied to the projects and works executed by domestic industry.

Progressively, the sector has internalized – irreversibly – advances such as: (1) sustainable buildings, (2) sustainable natural resource consumption, (3) development of environmentally friendly technologies and products, (4) environmental waste management of project sites, and (5) environmental education. More complex themes still require deeper study, among them the socio-environmental performance of the industry, including product and project lifecycle assessments.

Public policies aimed at sustainability have identified the contribution of the civil construction supply chain as an indispensable component of sustainable development. Making this potential a reality is a task for the sector, which has final responsibility for transforming feasible ideas capable of promoting real progress into concrete strategies. A major challenge involves rethinking cities from the perspective of enhanced environmental conditions. Investing in retrofitting of buildings and urban equipment could reduce resource consumption considerably and mitigate the negative effects generated by climate events, including the flooding which has become a recurrent phenomenon in urban centers.

Solutions must also be developed for more populated regions. The concept of compact cities should be pursued. It is critical to bear mind that these should include efficient land use strategies. Compact cities are aimed not only at bringing a measure of relief to the environment from urbanization, but promoting environmentally friendly transportation: walking, cycling, and public transportation. These solutions would offer savings with respect to non-renewable fuel use and cut emissions that contribute to
global warming. An additional strategic need is to study proposals capable of reducing transportation time and promoting, through technology, communication facilities and networks for work and leisure activities.

Brazil’s urban expansion, an inevitable consequence of population growth and access to housing, must be addressed from the perspective of sustainability. A total of almost 24 million new housing units are forecast to be built in the period 2009-2022 to meet the country’s needs in this area. Considered on the basis of residences with an average living area of 60 m², a full 2.1 billion m² will have to be built, covering more than 900 million m² of land. The occupation of new spaces and environmental preservation must be harmonized by balancing human needs and nature. This effort can generate positive impacts, such as the rehabilitation of degraded urban areas.

Housing policies are a fundamental ingredient for the orderly growth of cities. In general, the major urban centers must set aside traditional patterns of disorganized sprawl around cities. This process constitutes a focal point for longer term problems, such as the absence of infrastructure and transportation, education, health and leisure, not to mention the destruction of environmental heritage and social vulnerability. In the case of smaller cities, efforts must center on executing planned occupation policies, for the purpose of ensuring rational land use over the long term and the resolution of environmental and infrastructure liabilities for future generations.

A consensus exists today on the need for a more compact urban model, driven by greater government planning and regulation of the key aspects of urban expansion, with particular priority given to quality public transportation. Established urban centers must be valued through the creation of job opportunities, leisure and recreational options, and services not requiring long commutes. Indeed, these are needs which can longer be put off, which will demand the efforts of many administrations and, in the current context, the construction of thousands of housing units.

The expansion of housing in Brazil requires the development of large-scale projects, entire neighborhoods, with schools and health facilities, recreation centers, and a range of public transportation options, in addition to adequate sanitation. To this end, it is imperative that the private sector and government act in close coordination. Ultimately, this is the only way everyone can benefit from integrated and sustainable urban expansion.

The National Housing Plan (Plano Nacional de Habitação – PlanHab) lays out provisions to guide the urban growth process in the context of construction projects executed in urbanized areas with adequate public services. Indeed, this is a long-standing concern of society. In regard to construction specifically, the trend toward industrialization and rationalization of the process should be accelerated, taking into account the objective of reducing waste, emissions, and debris. Securing environmental efficiency of construction projects and real-estate properties sold on the market is imperative.

Real-estate offerings will increasingly require the inclusion of green areas, alternative energy sources, and rational water use as distinctive project elements. The private sector will need a favorable setting to promote this process, above all with respect to the pertinent tax questions relating to industrialization and technological innovation. Another critical measure, indeed the backbone of the entire effort, centers on combating unlawful practices and activities.
In exercising governance over the Brazilian civil construction industry for sustainable development, the CBIC has developed programs to bring greater visibility to the concept of the “green economy” in Brazil. These initiatives have been organized through the sector’s direct participation and in a manner consistent with the applicable public policies.

In 2011, the construction industry launched the Sustainable Construction Program (Programa Construção Sustentável – PCS), in which the sector’s various proposals for strengthening a green economy culture and practices in Brazil are consolidated. The product of the industry’s growth and deliberations over time, the initiative represents a realistic and robust contribution aimed at strengthening the bases for sustainable development in the country. The document seeks to harmonize positions and propose mutually agreed solutions. It serves to position the construction industry as a convergence point for sustainable development issues for the public and private sectors, research entities, universities, the third sector, and other spheres of society.

A summary of the priority programs implemented by the Brazilian Chamber of the Construction Industry and the PCS is provided below.
4.1 CBIC priority action programs

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Sanitation for living program

Objective – Data from 2008 of the Brazilian Institute of Geography and Statistics (Instituto Brasileiro de Geografia e Estatistica – IBGE) reveal that nearly 35 million Brazilian continue to live without treated water, while another 105 million people (more than half of the population) have no access to sewage treatment services. The country registers high rates of disease which affect the health and quality of life of a significant segment of the population. According to the United Nations Children’s Fund (UNICEF), the mortality rate for children under the age five, specifically 19.88 per 1,000 of live births, is the product primarily of Brazil’s inadequate basic sanitation system.

The purpose of the Sanitation for Living Program is to provide access to public water supply, sewage, solid waste management and disposal, and drainage system services through a series of recommendations capable of contributing to the formulation of public policies in the sector.
Dignified housing program

Objective – Ensuring the right to dignified housing is a fundamental principle of all developed countries and those striving to achieve sustainable development. A central component of the Dignified Housing Campaign, an initiative submitted to the government in 2008, is to advocate approval of Proposed Constitutional Amendment (Proposta de Emenda Constitucional – PEC) 285-A/2008, also denominated the “Housing PEC.”

The purpose of the Dignified Housing Project is to incorporate social housing on Brazilian society’s policy agenda, spur the development of a permanent funding policy for social interest housing, with a view to ensuring assistance to needy households (one to five minimum monthly salaries), and expand the residential housing market for construction companies, in addition to eliminating the housing shortage affecting the country’s poorest segments.

Technological innovation program

Objective – In recent years, technological innovation has emerged as a decisive aspect of the competitiveness of companies. The Technological Innovation Program is aimed at contributing toward the dissemination of innovation among small-, medium-, and large-scale enterprises throughout the supply chain, with a view to enhanced use of inputs, lower production times, and faster response to adverse situations. In partnership with strategic market sectors and different segments of society, the CBIC has formulated a series of contributions for the development of public policies.

Valuing workers program

Objective – A series of measures developed to foster professional capacity building and spark the interest of young persons in the civil construction industry, with a view to boosting demand for qualified workers at the operational and technical levels. One of the most important initiatives is the Next Step Program, an effort aimed at training Family Grant recipients for job openings in the sector.

Program for the incorporation of women in construction project sites

Objective – The Program has served to increase the number of women in the construction market as a means for meeting the demand for qualified workers and humanizing construction project sites. Female workers receive training through the Next Step Program.

Figures of the Ministry of Labor and Employment indicate that in the period 2007-2009 the number of women hired by construction companies grew 44.5%. In 2009, the construction sector registered an increase of 32.65% in overall hiring, reaching more than 2,221,000 workers, of which 172,734 were women (7.78%).
Built everironment innovation and sustainability park

Objective – The first Built Environment Innovation and Sustainability Park (Parque de Inovação e Sustentabilidade do Ambiente Construído – PISA) will be built in Brasilia and help transform the country’s construction industry. This novel initiative is aimed at contributing to the development of new construction methods and increasing the dissemination of innovation and sustainability to companies engaged in the construction industry. The key goal of the project is to implement a space for demonstrating new construction methods and technologies which are at once innovative, sustainable, and available at affordable prices.

Capacity building in sustainability management

Objective – Planned and executed with the Dom Cabral Foundation in 2011, the Program is intended to train managers in entities and companies on the incorporation of key sustainability questions in their processes, with particular emphasis on social corporate responsibility in their respective organizations and dissemination to actors in the sector. A total of seven modules were executed in which questions relating to sustainable development, ethics, sustainability management in construction, leadership in sustainability, ISO 26000, sustainable cities, and others were address. A second round of modules is slated to be offered in 2012.

4.2 CBIC Sustainable Construction Program (PSC)

The civil construction supply chain has a new agenda. Climate change and the natural resource scarcity require new forms of corporate and policy organization. The introduction of new forms of corporate and policy organization can transform the manner in which climate change and natural resource scarcity are addressed. For these questions are no longer restricted to the environmental plane. The model sought by the sector integrates human development, technological innovation, and the use and reuse of available resources, as well as recycling. This shift will require changes in the regulatory framework, market, product and input pricing, and profit and loss accounting. For their part, these changes will become reality when the challenges facing the construction supply chain are no longer addressed from a cost-based perspective, but as opportunities.

CBIC has played a leading role in identifying some of these opportunities. The Sustainable Construction Program calls on all actors to engage in action and dialogue – as first step on what sure to be a long journey ahead. The foundational elements of the proposals listed in these pages must be implemented in the proper proportion and at the appropriate speed throughout the established time periods. Achieving the respective goals will necessarily require the interaction and commitment of all industry actors, in addition to government, non-governmental organizations, and Brazilian society.
4.2.1 Overview of the PSC

Brazil is in the midst of a sweeping transformation. The clearest example of this is the expansion in consumption. Through 2014, more than 30 million households will have a monthly income above R$ 4,800.00. Attempting to meet this demand solely on the basis of the country’s current inventory of technology, products, and services could jeopardize sustainable development in Brazil in the medium and long terms. Spaces must be created to foster innovation, creativity, and proactive engagement, with a view to incorporating this new consumer segment sustainably.

Studies conducted by the Getúlio Vargas Foundation (Fundação Getúlio Vargas) on Brazil’s housing shortage indicate that through 2009 the country required an additional 5.81 million homes and that for the period 2010-2022 another 23.49 million new units would have to be built. This is the target Brazil will have to meet if it seeks to erase current and projected housing shortfalls and eliminate precarious living conditions. Today almost 85% of the country’s population is concentrated in urban areas, of which 23% are located in the five largest metropolitan areas. In regard to infrastructure, the country continues to face serious challenges which directly impact the quality of life of the population and undermine Brazil’s economic competitiveness. This adverse situation is the product of a long history of insufficient State investment.

According to the Brazilian Institute of Geography and Statistics (IBGE), in 2010 output in the construction sector grew by 11.6% – the largest increase in 24 years – and generated more than 329,000 formal jobs, as reported through the General Registry of Employment and Unemployment (Cadastro Geral de Empregados e Desempregados – CAGED). The supply chain refers to all of the processes ranging from raw material extraction, manufacturing of construction materials to the sale, design/planning, financing, and, ultimately, delivery of construction industry products.

As the global challenges of growth, urbanization, natural resource scarcity, and climate change lead to the emergence of a new economy, the transformation before us offers substantial opportunities within a broad spectrum of sectors dedicated to the construction supply chain. In addition to the structural questions of health, education and social assistance, and the environment, now more than ever Brazilian cities need to determine the appropriate shares and proportions of co-responsibility, with a view to addressing the challenges of mobility, infrastructure, sustainability, and coexistence.

4.2.2 Context and construction

The civil construction supply chain has evolved sufficiently to promote harmonious, responsible, and integrated development based on an agenda with proposals aimed at addressing the issues considered in these pages. A total of seven priority – or critical – areas have been identified. For purposes of connecting them to the objectives pursued under the Sustainable Construction Program, the seven priority areas are described in detail further below. There is an inextricable connection between the present moment in Brazilian society and the sustainable future of a nation in the midst of a dynamic development process. The seven priority areas are: water; human development; energy; materials and systems, environments, infrastructure, and urban development; climate change; and waste.
For the sector to achieve universal status, action will be required on four basic axes: fostering sector and public policies and legislation; attention to the State’s procurement capacity; development of project designs; technological innovation, and people and process managements. The Program offers a path toward determining guidelines, practices, and priorities capable of transforming sustainable construction into a reality in Brazil. The related proposals stem from ongoing dialogue between the construction supply chain and experts in the fields of water; human development; economics and urban development; energy, materials, solid waste; infrastructure, environment, and sustainable urban development. Similarly, these proposals are the product of coordinated efforts within the CBIC, with the support of a set of partner organizations within the framework of the Sustainable Construction Program created in 2009.

The product of a collaborative effort, the Program reflects the vision and experience of all construction industry segments with public actors, civil society, universities, non-governmental organizations, regional partners, and experts engaged directly in the issues considered in these pages. The objective of the program is to stimulate companies, government, and society to rethink their products, relations, services, and strategies based on environmental, social, and economic factors; to combat and eliminate illegality and informality in the construction supply chain; to ensure safety, efficiency, and responsibility to all interested target audiences and for the benefit of the environment; to know and comply with the applicable laws and, voluntarily, reach beyond minimum obligations in respect of those matters deemed of special relevance for the well-being of society; and, finally, to communicate with employees, suppliers, partners, and collaborators, with a view to spurring toward assuming a leadership role and sustainable development.

The program does not prescribe a specific plan or model. Rather, it provides a platform to the country’s public sphere for the purpose of implementing measures and interacting with companies, society, and government. The CBIC believes dignified living conditions are a cornerstone for ensuring the population full access to its fundamental rights: health, education, work, mobility, security, water, energy, and others.

Everyone is invited to take part in the discussion. In particular government for the purpose of considering the proposed vision and actions and policies and regulatory frameworks necessary to guide and organize society and provide incentives to steer the sector in the direction of sustainability by offering companies the opportunity to innovate, grow, and deliver solutions.

As such, this document strives to offer all the parties involved an active and continuing program for enhancing relations with the individuals and public and private institutions engaged in our actions. The objectives reveal that the construction supply chain’s leadership, behavioral changes, and social mobilization will be decisive for the program’s success, just as technological innovations and solutions will have a central role in this process.

It is important to underscore the strategic and fundamental importance the Sustainable Construction Program attaches to education, an essential cross-cutting issue affect all seven axes of proposed action outlined in this document. Although distinct, the priority themes are, to be sure, inter-disciplinary. They are, for example, directly related to the
other structural programs pursued by the federal government and the CBIC, including the Growth Acceleration Program (Programa de Aceleração do Crescimento – PAC); My Home, My Life (Minha Casa, Minha Vida); Dignified Housing (Moradia Digna); Technological Innovation Program (Programa Inovação Tecnológica – PIT); Next Step (Próximo Passo), and Sanitation for Living (Sanear é Viver).

The following organizations participated in the Strategic Council of the Sustainable Construction Program: Brazilian Association of the Construction Materials Industry (Associação Brasileira da Indústria de Materiais de Construção – ABRAMAT); Chamber of the Construction Industry – Minas Gerais State Federation of Industry (Câmara da Indústria da Construção – Federação das Indústrias do Estado de Minas Gerais – CIC/FIEMIG); Unified Union of Workers (Central Única dos Trabalhos – CUT); CBIC Environmental Commission; National Confederation of Industry (Confederação Nacional da Indústria – CNI); Brazilian Council on Sustainable Construction (Conselho Brasileiro de Construção Sustentável – CBCS); Brazilian Business Council for Sustainable Development (Conselho Empresarial Brasileiro para o Desenvolvimento Sustentável – CEBDS); Polytechnic School of the University of São Paulo (POLI/USP); Força Sindical; Local Governments for Sustainability (Governos Locais pela Sustentabilidade – ICLEI); Holcim Brazil; Brazilian Institute of Architects (Instituto de Arquitetos do Brasil – IAB); Legislative Branch; United National Environmental Program (UNEP); SECOVI – São Paulo; Architecture and Engineering Association (Sindicato da Arquitetura e da Engenharia – SINAENCO); SINDUSCON – RS; SINDUSCON – SP; SINDUSCON – Florianópolis; SINDUSCON – PE, and Federal University of Santa Catarina (UFSC).

To all those taking part in and associated to the Sustainable Construction Program, our task now is to mobilize society and government on the actions proposed in these pages over a range of timed periods extending through 2002.

### 4.2.3 Objectives

<table>
<thead>
<tr>
<th>PRIORITY THEMES</th>
<th>OBJECTIVES</th>
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<tbody>
<tr>
<td>Water</td>
<td>Rational Water Use</td>
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<tr>
<td>Human Development</td>
<td>Valuing Human Beings</td>
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<tr>
<td>Energy</td>
<td>Maximizing energy efficiency</td>
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<tr>
<td>Materials and systems</td>
<td>Utilizing sustainable materials and systems</td>
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<tr>
<td>Environment, infrastructure, and urban development</td>
<td>Implementing sustainable development</td>
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<tr>
<td>Climate change</td>
<td>Adapting the built environment</td>
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<td></td>
<td>Reducing greenhouse gases in the supply chain</td>
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<tr>
<td>Waste</td>
<td>Decreasing natural resource use</td>
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### 4.2.4 Strategies

<table>
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<tr>
<th>STRATEGIES AND ACTORS</th>
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<tbody>
<tr>
<td><strong>Incentive</strong></td>
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<tr>
<td><em>Public Policies</em></td>
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<tr>
<td>Productive sector encourages the Executive Branch at the three levels of government to stimulate within the scope of its procurement procedures the use of more sustainable products and systems based on designs and specifications that meet environmental requirements, such as eliminating energy waste and including solutions for lower water consumption levels.</td>
<td>Union and state, municipal, and district government</td>
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<tr>
<td><em>Sector Policies</em></td>
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<tr>
<td>Productive sector gives preference in its procurement procedures to the use of products and systems with better environmental performance and advocates steering State procurement power toward sustainable construction.</td>
<td>Companies, CBIC, and other representative entities</td>
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<tr>
<td><em>Strengthening Legal Framework</em></td>
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<tr>
<td>Productive sector acts with the public sector to develop laws and regulations on behalf of sustainability in the Brazilian civil construction industry.</td>
<td>Legislative and Judicial Branches</td>
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<td><strong>Production</strong></td>
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<td><em>Project Design</em></td>
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<tr>
<td>Projects employ materials and systems that contribute to energy efficiency, incorporate guidelines to enable rational water use, are of verifiable origin, value products derived from proper forest management processes, and take into account climate change impacts. In the case of public works, propose a public project selection process for contracting of the best technical proposal in which sustainability criteria are duly considered.</td>
<td>Supply Chain</td>
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<tr>
<td><em>Technological Innovation</em></td>
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<tr>
<td>Adapt construction and maintenance equipment and processes in public and private projects to ensure equipment construction and maintenance processes meet either the recommended or mandatory levels provided for by environmental and energy law.</td>
<td>Supply Chain</td>
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<tr>
<td><em>Person and Process Management</em></td>
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<tr>
<td>Designers, specifiers, workers, project executors, business managers, financial agents, public administrators, property managers (administrators, trade unions, facilities companies), lawmakers, and users should receive multi-disciplinary awareness-raising and capacity building in sustainability. Construction systems involve procedures to reduce the loss of materials, enhance waste management, lower energy consumption, and ensure rational water use.</td>
<td>Supply Chain</td>
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<tr>
<td><strong>Sustainability</strong></td>
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<tr>
<td>Through legally formalized sector and public policies, the post-construction process benefits from more cost effective and efficient the operation and maintenance. Environmental preservation, achieved through the dissemination of ecological consciousness on modern and intelligent processes, is the key benefit to Brazilian society, which is afforded the opportunity for economic and cultural development.</td>
<td>Supply Chain</td>
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### 4.2.5 Actions

<table>
<thead>
<tr>
<th>AREAS</th>
<th>ACTIONS</th>
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<tbody>
<tr>
<td><strong>Water</strong></td>
<td>Stimulate contracting of project that take into account the best solutions for lower levels of water consumption.</td>
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<tr>
<td></td>
<td>Prepare handbook of good practices.</td>
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<td>Develop capacity building program for the sector.</td>
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<td></td>
<td>Qualify water and sewage concessionaires.</td>
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<td></td>
<td>Incentivize storm and runoff drainage and management in cities.</td>
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<tr>
<td><strong>Human Development</strong></td>
<td>Encourage self-regulation mechanisms in the supply chain (legal conformity).</td>
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<td></td>
<td>Perform socioeconomic mapping to create a national continuing capacity building program.</td>
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<td></td>
<td>Provide capacity building to professionals in the application of Law Nº 11888/2008 to ensure free public technical assistance to low-income families in the design and construction of social interest housing.</td>
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<td></td>
<td>Review undergraduate, technical, and vocational course curricula for the purpose of incorporating sustainability subjects.</td>
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<tr>
<td><strong>Energy</strong></td>
<td>Use of seals as a means to assess energy efficiency in the project phase and delivery of buildings.</td>
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<td></td>
<td>Encourage for private buildings meeting level A or B.</td>
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<td></td>
<td>Require new building to meet level A or B.</td>
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<td></td>
<td>Stimulate retrofit, with a view to enhancing efficiency (A or B).</td>
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<td>Incentivize the distribution of generated power.</td>
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<td>Enact specific legislation to stimulate retrofitting.</td>
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<td>Create effective information and communication mechanisms.</td>
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<td>Provide capacity building to actors and consultants in the supply chain.</td>
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<tr>
<td><strong>Materials and Systems</strong></td>
<td>Map and disseminate project systems and designs aimed at reducing the loss of materials.</td>
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<td>Reinforce the requirement to purchase products in conformity with Brazilian Association of Technical Norms – ABNT (SIMAC/PBQP-H Materials Conformity Program – PSQ), with a view to ensure minimum competitive quality and isonomy.</td>
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<td>Incentivize contracting of products and systems with better environmental performance.</td>
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<td>Implement public database with technical information and environmental declarations.</td>
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<td>Foster research, development, and innovation of new construction materials, components, and systems with less environmental impact.</td>
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<td>Promote proof of proper forest origin.</td>
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<td>Foster the use of the Forest of Origin Document.</td>
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<tr>
<td>AREAS</td>
<td>ACTIONS</td>
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<tr>
<td><strong>Environment, Infrastructure, and Urban Development</strong></td>
<td>Implement a management system to develop master plans.</td>
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<td>Incentivize initiatives for the recovery of degraded areas.</td>
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<td></td>
<td>Establish criteria and procedures to expedite the recovery of degraded areas.</td>
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<td>Prepare inventories of risk areas and degraded areas.</td>
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<td>Participate in the organization and creation of the Technical Civil Construction Chamber within the National Council on the Environment – CONAMA.</td>
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<td>Stimulate initiatives to reuse timber seized by the Brazilian Institute for the Environment and Renewable Natural Resources – IBAMA.</td>
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<td>Value good practices and municipal actors for the purpose of formulating public policies that are in line with the needs and interests of urban inhabitants.</td>
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<td><strong>Climate Change</strong></td>
<td>Promote specific legislation, including building codes.</td>
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<td>Support measures for emission reduction and adaptation to climate change impacts in environmental licensing procedures.</td>
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<td>Develop tools to generate greenhouse gas inventories for the construction supply chain.</td>
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<td></td>
<td>Prepare a national plan to educate stakeholders and public managers on mitigation solutions centered on the realities of Brazilian climate conditions.</td>
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<td></td>
<td>Effective participation of the civil construction industry in the Climate Forum/ Brazilian Climate Change Forum.</td>
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<tr>
<td><strong>Waste</strong></td>
<td>Promote public-private partnerships for the implementation of waste management areas.</td>
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<td>Promote participation of the supply chain in the development of state and municipal legislation within the scope of the National Solid Waste Policy.</td>
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<td>Map difficulties and obstacles in licensing procedures for transshipment and sort areas, recycling activities, and implementation of landfills.</td>
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<td>Implement an online waste management database for the waste generation, transportation, treatment, and destination network.</td>
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<td>Effectively establish reverse logistics by suppliers, as provided for under the respective sector agreements.</td>
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WATER

Enhancing water resource management as a means to combat waste and promote rational water use in Brazil is an essential element for developing a sustainable construction supply chain. Data from the National Water Agency (Agência Nacional de Águas – ANA) indicate that of Brazil’s 5,565 municipalities 55% could face water supply shortages by 2015. In response to this challenge, R$ 22 billion will have to be invested in the coming years. Through 2025, an additional R$ 70 billion will be required, primarily for source water projects and sewage collection and treatment, for the purpose of protecting water supplies (rivers and lakes). Taken together the corresponding areas will be home to 139 million people, or 72% of the country’s population, by 2025.

According to the Ministry of Cities’ National Sanitation Information System (Sistema Nacional de Informações sobre Saneamento – SNIS), more than one-third of the water drawn from the natural environment by water supply companies is lost during distribution. SNIS data from 2008 reveal that average water consumption in Brazil is 150 liters/inhabitant per day, with higher income regions registering greater total consumption. In addition, according to the Ministry of Cities only 50.6% of the urban population receives sanitation services, while a mere 34.6% of all sewage is treated. Waste is released into water courses or the ground, leading to the risk of contamination and disease. The problem extends to substantial volumes of water contaminated by industrial and irrigation activities.

Enacted in 1997, the National Water Resources Policy (Política Nacional de Recursos Hídricos) has consistently and effectively strengthened productive activities in which water is a basic input by promoting respect for the integrity of Brazil’s watersheds. However, it is critical to secure the commitment of governments and the efforts of society to ensure the legislation and its related instruments are advanced and used to regulate the access to this valuable resources. Current levels of waste by public concessionaires – which, according to SNIS data, average on the order of 40% and reach as much as 55% in some Brazilian cities – are unacceptable and unjustifiable if the country is to continue funding expanded water supplies.

To this end, rational water use in the construction supply chain must not only involve promoting education among the pertinent actors, but fostering integrated management (handling and drainage), as well as ensuring balanced management of supply and demand and technological innovation. Sustainability of the input is contingent on reducing demand on at least three levels: macro, through rational water extraction; intermediate, through optimized management of public systems; and micro, through optimization of water consumption in buildings. Above all, water management in buildings must include: supply of potable water; storm water and runoff management; and sewage treatment.

Since 2007, municipalities across Brazil have approved laws mandating the installation of individual water meters in new buildings. Currently, laws to this effect are in place in cities such as Belo Horizonte, Porto Alegre, and São Paulo. According to the São Paulo Property and Condominium Association (Associação das Administradoras de Bens Imóveis e Condomínios de São Paulo – AABIC), on average the measure has led to a 40% reduction in monthly water bills. The assessment is based on a comparison of water costs in buildings initially equipped with collective meters, which subsequently opted to install...
individual meters. In general, the switch to individual meters is provided for under the respective laws, although the consent of a majority of building residents is still required. In addition to the economic benefits, individual meters promote changes in personal habits by offering users the possibility to measure and reduce their consumption levels.

The Sustainable Construction Program proposes:

- establishing policies to stimulate the reuse of storm water and runoff in residential, commercial, and government buildings;
- preparing and implementing by 2014 a handbook of good practices with guidelines on rational water use. The handbook should be based on the following objectives: promoting the contracting of projects that include solutions for lower water consumption; proposing laws mandating individual water meters in new and existing buildings; fostering more economical solutions for the use of potable water and alternative water sources; promoting the interface with the pertinent public policies and programs, including My Home My Life and the National Program to Combat Water Loss (Programa Nacional de Combate ao Desperdício de Água);
- promoting and requiring enhanced public management by 2014 through integrated handling and drainage of storm water and runoff and increased soil permeability, particularly in urban areas;
- implementing regional capacity building, education, and awareness-raising programs on rational water use as of 2011 for all professionals in the construction industry (designers, architects, engineers), other actors engaged in the sector (building administrators, facilities companies), and consumers;
- developing management training programs for water and sewage concessionaires, with a view to reducing current levels of water loss during distribution.

HUMAN DEVELOPMENT

The human development agenda is perhaps the most extensive as well as the most decisive for sustainability. In the construction supply chain, low schooling levels, subpar productivity, and inadequate wages are just some of the obstacles to sustainable development. This situation is further exacerbated by the phenomenon of informality and, in many cases, the lack of access of construction workers to basic housing, hygiene, health, sanitation, water, mobility, and food security.

A survey by the Brazilian Institute of Geography and Statistics (Instituto Brasileiro de Geografia e Estatística – IBGE), the Institute for Applied Economic Research (Instituto de Pesquisa Econômica Aplicada – IPEA), and the Getúlio Vargas Foundation (Fundação Getúlio Vargas – FGV) estimated that of the 10 million people employed in the industry 61% are subject to informal, illegal, and non-compliant working conditions. These issues serve to bring to light additional challenges: from noncompliance with labor obligations to tax evasion across the supply chain – extending from the extraction of raw materials to the production and sale of construction supplies, to the building design process and project sites and maintenance – in addition to non-fulfillment of quality standards and breach of environmental legislation.
While the underlying vector for change is the new economy, education emerges as a key component. One of the most important human development measures under the Sustainable Construction Program involves fostering initiatives with government, educational and financial institutions, and non-governmental actors to promote and demand compliance and legality in the sector.

The growing demand for qualified professionals in the construction industry has also prompted actions to disseminate, interface, and align CBIC capacity building and research and development (R&D) programs undertaken with universities, technical schools, and training institutes. Long-term public policies to promote economic stability and support construction activities will also contribute to professional training efforts.

The Sustainable Construction Program provides for the following initiatives:

- mapping and disseminating good practices in the adoption of criteria relating to legal compliance verification, socio-environmental responsibility, conformity, and quality across the construction supply chain. A key objective of the measure is to promote self-regulation by companies, for the purpose of ensuring full compliance with the law and the application of criteria to professionals, products, and services;

- socioeconomic mapping to identify the scope of demand for capacity building, educational, and awareness-raising programs in security, environment, health, innovation, and sustainability. Establishing, to this end, partnerships between trade unions and business associations tied to the CBIC, as well as SENAI and SESI, for the purpose of implementing a national continuing capacity building program centered on meeting specific regional needs in education and professional training;

- professional capacity building for the application of Law Nº 11888/2008 to assure low-income families free public technical assistance in designing and building social interest housing;

- undertaking a national review of university curricula, vocational training courses, and capacity building programs for instructors in professional construction training courses. The review should incorporate specific cross-cutting topics relating to formal employment, quality, conformity, innovation, and sustainability. An additional need resides in eliminating illiteracy among construction workers.

ENERGY

Building energy efficiency is a key indicator and requirement for sustainable structures. In Brazil, electric power consumption in buildings accounts for nearly 44% of all billed electric power consumption in the country, of which 22% corresponds to residential structures, 14% to commercial establishments, and 8% to government buildings. Given Brazil’s status as a developing country, the trend points to increased consumption moving forward.

From 2007-2010, Brazil made significant strides in promoting sustainable development through launch of the National Energy Conservation Seal in Residential, Commercial, Service, and Government Buildings (Etiqueta Nacional de Conservação de Energia...
em Edifícios Residenciais, Comerciais, de Serviços e Públicos) (INMETRO/PROCEL) – and the 2030 National Energy Plan (Plano Nacional de Energia 2030) – an underlying goal of which is to achieve a 10% across the board reduction in electric power consumption by 2030.

The optional seal for new and existing buildings will become mandatory for new buildings within a period to be determined by the Ministry of Mines and Energy. The objective of the system is to lay the groundwork for determining the energy efficiency of buildings on a scale ranging from A (highest efficiency) to E (lowest efficiency) and granting the seal in two stages: during the design process and following completion. In commercial, government, and service buildings, three systems are evaluated: envelope, lighting, and HVAC. In the case of residential buildings, the following components are evaluated: envelope and water heating systems, in addition to systems implemented in common areas of multi-family buildings, including lighting, elevators, centrifuge pumps, and others.

Despite its continued optional status in Brazil, there are currently positive signs from the construction sector in relation to the seal’s use by the industry itself and by other actors within the sector. Among these, for example, is the growing tendency of government agencies to adopt the seal as a required criterion in future competitive bidding procedures for government building projects and the promotion of financial incentives with longer repayment periods and lower interest rates for expanding, building, renovating, and modernizing hotels that secure level A energy efficiency certifications.

Promoting legislation mandating the use of energy conservation seals in buildings and facilities as well as incentives for and monitoring of its implementation are underlying goals of the Sustainable Construction Program. The Program’s actions include a proposal to ensure new buildings completed as of 2022 meet the Zero Energy Buildings (ZEB) target and operate on the basis of maximum efficiency through local power generation using renewable sources.

To this end, the Program proposes:

- providing incentives for distributed power generation (instead of strictly centralized generation) through renewable sources and the development of intelligent networks to enable sharing of excess local power supplies in buildings;
- drawing up specific legislation on the basis of the energy seal to stimulate efficiency in buildings and provide fiscal and tax incentives for the equipment, materials, and consumption goods used in building projects and by building occupants, including tax breaks for the most efficient facilities and added charges for the least efficient structures. The legislation should apply to public and private projects by 2014, for the construction of level A or B buildings;
- encouraging application of the energy efficiency seal in new private buildings and mandating the seal for government buildings, with a view to meeting level A or B specification by 2014 in all major metropolitan areas and by 2016 throughout the remainder of the national territory. The new legal framework ensures the execution of regular government energy audits in all Brazilian buildings by 2022 – and in all government buildings by 2018 – for the purpose of monitoring performance and indentifying and offering opportunities for implementation of the necessary
enhancements. The legislation should provide for regular public awareness and education campaigns (beginning in 2012) to address the lack of knowledge on and underscore efficient behaviors, with special emphasis on objective information concerning pricing versus energy performance of buildings and individual equipment;

- promoting the development of specific legislation to incentivize retrofitting of existing buildings (government and private) and mandatory use of the energy efficiency seal for all buildings as of 2018. The objective is to establish a national renovation program to increase energy efficiency in all current buildings. The legislation will extend to the three levels of the executive branch: municipal, state, and federal;

- capacity building for various actors and consultants engaged in the supply chain (especially designers, building administrators, and facilities management companies) in the production and operation of intelligent buildings with high energy efficiency. The capacity building effort should underscore the importance of investments in the project development stage as a means to ensure lower costs in the building operations and maintenance stages.

MATERIALS AND SYSTEMS

Execution of the entire construction supply chain, from initial preparation activities such as earthworks to the production, maintenance, and effective use of facilities and buildings, is contingent on a continuous flow of materials and systems. International estimates indicate that the construction industry is responsible between 40% and 75% of all natural resource use. In Brazil, statistics have not yet been developed to determine the distribution of material utilization throughout the economy, thus hampering precise quantification of consumption levels across the construction supply chain. However, there is wide recognition as to the substantial material losses and impacts caused by large-scale extraction of raw materials.

Beyond the production of construction materials, the entire supply chain and respective life cycle are key sources of environmental impact as well. For example, in addition to greenhouse gas emissions arising from production and transportation, certain materials generate emissions during utilization and after utilization in construction projects. Volatile organic compounds affect air quality within buildings and worker health while contributing to climate change. Similarly, water that comes into contact with materials may leach toxic compounds, altering or even contaminating the soil, groundwater, and, ultimately, the food chain. Moreover, there are materials without a Chemical Product Safety Information Registry (Ficha de Informação de Segurança dos Produtos Químicos), which generally pose risks to the health of workers and even users.

The quantity and quality, reliability, and detail of the information provided on material and components sold in Brazil all fall short of what is necessary to ensure adequate decision making. Often, price is the only criterion or objective applied. The absence of an environmental declaration, of the life cycle evaluation, and of standardized information adversely affects the application of existing data and represents an obstacle to Building Information Modeling – BIM, which simulates the characteristics of the construction elements to be use in the actual life cycle of structures, thereby ensuring enhanced performance.
The measures of the Sustainable Construction Program include:

- mapping and disseminating across the construction supply chain of the construction systems and project tools capable of reducing material losses in the related processes;

- engaging with the Ministry of the Environment, through the Plan of Action for Sustainable Production and Consumption (Plano de Ação para Produção e Consumo Sustentáveis – PPCs), to ensure public and private contracting gives preference to products and systems with optimized environmental performance. To this end, competitive bidding procedures will have to include the determination and implementation of environmental performance criteria that take into account the logistics and transport of products and materials, in addition to measurement tools. As such, promoting the use of environmental performance information and simulation tools and life cycle evaluation procedures for materials and systems across the construction supply chain will allow suppliers to identify measures that offer the most eco-efficient products and ensure durability and/or include greater quantities of residual raw materials;

- contributing to the development of a public database by 2014 with technical information and environmental declarations on the Brazilian systems, products, and raw materials used in the construction supply chain. The information will be provided by each segment of the materials industry on dates consistent with the internal agreements of each supply chain;

- fostering research, development and innovation in new reduced environmental impact construction materials, components, and systems. The effort requires combining funding for research and innovation, training of human resources, and public and private projects that adopt new technologies. The related public policies must promote professional training across the construction supply chain, with a view to developing sustainable materials and systems technologies;

- promoting and implementing capacity building initiatives for companies across the construction supply chain to ensure the responsible procurement of legal timber, including through the development of educational materials and implementation of training programs;

- reinforcing through the Program the mandatory procurement of products in conformity with ABNT Standards (SIMAC/PBQP-H PSQs), with a view to ensuring minimum quality standards and fair competition.

The Sustainable Construction Program aims to contribute to the strengthening and effective implementation of the Brazilian Life Cycle Evaluation Program (Programa Brasileiro de Avaliação de Ciclo de Vida – PBACV), an initiative undertaken within the Ministry of Development, Industry, and Foreign Trade/INMETRO. There is a need for the system to incorporate streamlined ACV methodologies capable of rapid assimilation by the industry on a large scale capable of delivering results consistent with Building Information Modeling – BIM models. The measure will result in the implementation of an environmental impact assessment system for the production and consumption of goods and services in the country capable of:
organizing, storing, and disseminating standardized information on the life cycle inventories for Brazilian industrial production;

- publishing and disseminating the methodology for development of Brazil’s inventories;
- developing base inventories for Brazilian industry;
- supporting the development of critical mass in the Life Cycle Evaluation process;
- publicizing and supporting mechanisms to disseminate information on life cycle thought and view;
- intervening in and influencing international and national standardization efforts relating to the issue and identify the primary categories of environmental impact for Brazil.

ENVIRONMENT, INFRASTRUCTURE, AND URBAN DEVELOPMENT

In essence, the expected outcome of the implementation of sustainable buildings is the development of communities adapted to the needs of the respective users, today and in the future. These communities require, for example, safe and healthy spaces; well designed public and green areas; efficient natural resource use, including within built environments; mobility; service delivery; energy efficiency; thoughtfully planned soil/land use; water resource conservation; protection from floods; reduced waste; and others.

IBGE data reveals that more than 80% of the Brazilian population currently resides in cities. As the urbanization process proceeds (which it is expected to by as much as 30% worldwide through 2050, according to the World Business Council for Sustainable Development), substantial changes in the enormous set of actions undertaken in urban spaces will be required to raise quality of life, through improvements to community infrastructure, such as water, sewage systems, mobility, and other facilities.

In Brazil, disorganized growth, primarily in the largest urban centers, has resulted in precarious settlements and the occupation of vulnerable areas, such as hillsides and regions susceptible to flooding and landslides. As an example, the United National Programme for Human Settlements (UN-Habitat) notes that even following the removal and resettlement of 10.4 million people from precarious settlements in the last ten years, Brazilian cities remain among the most unequal in the world. Those 10.4 million people translated, according to the UN, into a 16% reduction in the proportion of Brazilians living in precarious settlements, from 31.5% to 26.4% between 2001 and 2010. As such, underlying inequality persists for a significant portion of the population in respect of the allocation of land, public spaces, and urban services.

In addition, the current urbanization model is on a collision course with present day concepts of the climate change mitigation. If the computation of greenhouse gas emissions in cities throughout the world encompassed factors such as energy consumption and generation, transportation, and industrial production, urban areas would emerge as the principal villains in this process, accounting for 70% of all emissions despite occupying a mere 2% of the planet’s land surface. Indeed, UN-Habitat’s report “Cities and Climate Change: Global Report on Human Settlements 2011” presents the world’s cities as the leading actor in the climate change drama. In Brazil’s case, planning requires the implementation of permanent policies to stimulate not only investments but enhanced
execution of available funds by the public sector, including expanded public transportation offerings, urbanized land areas, decent housing, and other basic services.

The challenge is made all the more complex in Brazil due to the shortage of land in urbanized areas of the country’s cities, which drives lower income population to inhabit increasingly distant locations without access to public equipment and services. At the other end of this phenomenon lies the search for solutions to enable the urbanization of areas located away from major metropolitan centers without excessively raising land values, a dilemma that often precludes the execution of low income housing projects. Currently, these issues impose major constraints on the sustainable expansion of cities. To be sure, they have generate a set of adverse consequences for the economy, the environment, and the lives of ordinary people which run from lost time and productivity at work to increased pollution and illness and accidents.

Striving for the provision of public and private funds and investments aimed at sustainable planning and more integrated cities, through increased capital and labor allocations, as well as the delivery of basic services to a larger number of people and access to low carbon emission mobility models, are central targets of the Sustainable Construction Program in fields of the environment, urban development, and infrastructure. To this end, the Program seeks to:

- incentivize management systems for the implementation of Master Plans with technical quality criteria and provisions on the size and vulnerabilities of municipalities and strive to ensure quality criteria are monitored by the Federal and Municipal Courts of Accounts (Tribunal de Contas). It is of critical importance that these measures be aligned with the respective regional housing and sanitation programs;
- incentivize and develop initiatives for the recovery of degraded areas, through public-private partnerships (PPPs) and non-governmental sectors. The related initiatives include valuing real estate activities as a driver for the recovery of these areas;
- endeavor to establish special criteria and procedures within state and municipal environmental agencies to expedite the recovery of degraded areas;
- demand that the government devote resources toward the development of inventories of risk areas and degraded areas (providing differentiated treatment for urban and rural zones), capable, in addition, of ensuring the removal and resettlement of inhabitants away from those areas;
- participate in and demand seats for the construction supply chain in various bodies (councils, technical chambers, and working groups) and incentivize the creation of the Technical Chamber for Civil Construction (Câmara Técnica da Construção Civil) within the National Environmental Council (Conselho Nacional do Meio Ambiente – CONAMA);
- implement and stimulate initiative for the use of IBAMA seized timber in housing and infrastructure projects in rural areas and risk areas;
- value good practices and the leading actors in municipalities in fields including health, transportation, education, the environment, housing, and sanitation, for the purpose of developing public policies that are in line with the real needs and interests of urban dwellers.
CLIMATE CHANGE

The construction supply chain has had a prominent role in the global discussions on the question of climate change. Data from key initiatives launched by leading public and private actors in the field, the Sustainable Buildings & Climate Initiative (SBCI) and the United Nations Environmental Programme (UNEP), reveal that buildings currently account for 40% of global energy consumption and up to 30% of all greenhouse gas emissions (GGEs) from energy consumption. In addition to the emissions from energy consumption, the construction supply chain is responsible for a substantial portion of all GGWEs in the atmosphere derived from the manufacture and transportation of materials, the use of materials in construction and post-construction activities, and waste treatment, all of which, in many cases, generates added pressure on soil and urban water and sanitation systems.

From 1990 to 2007, when the Inter-Governmental Panel on Climate Change (IPCC) published its four periodic reports, the scientific evidence on global warming mounted. Indeed, the final report expresses a high level of certainty and confirms that changes in the earth’s climate system are the result of increased GGEs arising from human activity. The 2007 report goes so far as to affirm that climate events, including heat waves, torrential rains, prolonged droughts, will become more frequent and severe and that ecosystems and water systems will be significantly altered. The need to reduce GGEs in order to enable the adaptation of ecosystems to climate change is at this point recognized at the global level, constituting, in fact, the key target of the United Nations Framework Convention on Climate Change.

Reducing emissions in the construction supply chain does not imply hamstringing or obstructing the industry, but rather making it more efficient from an environmental, economic, and social standpoint. Indeed, this is one of the basic premises of the Sustainable Construction Program. Fostering climate change adaptation and mitigation initiatives is a guiding component of this document, with a view to enabling substitution of the energy, construction, materials production, and waste treatment models currently in place with low carbon emission and high eco-efficiency systems by 2022.

As set out in the United Nations Framework Convention, the concept of mitigation, as provided for in the 2009 law establishing Brazil’s National Climate Change Policy, refers to “mitigating the effects of a particular external impact on a system, in conjunction with precautions and attitudes to eliminate the interference, specifically, as pertains to climate, intervention for the purpose of reducing those factors caused by human activity which contribute to climate change.” For its part, the concept of adaptation refers to “initiatives or measures capable of reducing the vulnerability of natural systems and society to the real or expected effects of climate change.”

The mitigation strategies set forth in the Sustainable Construction Program provide for rational energy use by the sector; reduced waste generation; eco-efficient treatment of liquid effluents, sewage, and electric power generation based on the employment of biogas; recycling or re-use of waste and materials; alignment between water supply and demand; promotion of awareness-raising campaigns on rational energy and water use in construction and post-construction activities; promotion and adop-
tion of energy efficiency programs and sustainable procurement systems across the construction supply chain (including materials logistics and transportation); and use of projects/designs based on bioclimatology.

The measures proposed in this section include:

- stimulating the formulation of specific standards, including building codes, setting forth quality and conformity criteria that take into account the prevention of climate change impacts. These standards, developed jointly by the public and private sectors, should also consider incentives for sustainable procurements;

- supporting the inclusion in environmental license procedures of criteria on emission mitigation and adaptation measures in connection with climate impacts in construction projects;

- formulating and implementing tools for the development of greenhouse gas inventories (such as the Brazilian Greenhouse Gas Protocol) for all segments of the construction supply chain;

- developing and implementing within the scope of the Ministry of the Environment a national plan to raise awareness among stakeholders and public managers that mitigation solutions should extend beyond energy efficiency measures. The effort must include preparation of a handbook of good practices with solutions involving the implementation of measures to reduce climate change impacts in new construction projects;

- effective participation by the sector in the Climate Forum/Brazilian Forum on Climate Change.

WASTE

Of the set of initiatives required to ensure the domestic construction industry’s progress, WASTE management is perhaps the area with the greatest potential to produce significant results in the short term. Currently, Brazil has a body of laws and regulations reflected in the National Solid Waste Policy, National Environmental Council – CONAMA Resolution 307, and the National Basic Sanitation Policy, all of which contribute to placing the sector at a relatively advanced stage on this question.

Overcoming internal and external challenges across the construction supply chain is of critical importance to assure the country builds on the current management level attained in this area, through efforts such as: promoting and implementing self-regulation; effectively exercising and mandating reverse logistics and the formalization of waste flows in order to clearly set out the chain of responsibilities in the post-project stage, and ensuring, to this end, the full legality of the activities performed by transportation and receiving agents.

It is estimated that the construction sector generates between 20% and 25% of all waste produced by Brazilian industry. The amount varies depending on the level of construction and maintenance activity and the specific construction practices employed.
A portion of the waste generated by the construction industry stems from losses in the related processes, as well as waste generated prior to the construction and demobilization stages, including raw material extraction and the production, transportation, and sale of materials.

For construction companies and developers and local governments and society alike, managing the waste produced by construction and demolition activities results in high costs. The clandestine disposal of waste has exacerbated the attendant environmental impacts by leading to the silt build-up in streams, clogging drainage systems, and, consequently, triggering, in some cases, at least, urban flooding. For their part, illegal landfills often are seen as an attractive alternative due to their low cost, a trend that serves only to further aggravate the problem.

To meet the responsibilities prescribed in the National Solid Waste Policy and related directives at the state and municipal levels, the sector has advocated incentivizing self-regulation (or even creating and implementing the conditions for third parties to this end). Indeed, self-regulation is an instrument that has been vigorously under the Sustainable Construction Program and one that firmly establishes the industry’s formal segments as an agent of sustainability. In regard to the relationship between construction companies and input producers, there has never been a more propitious time to enact rules that advance goal of sustainable development.

In this context, the Sustainable Construction Program proposes:

- promoting public-private partnerships to effectuate the gradual implementation of waste management areas, from state capitals down to the smallest municipalities;
- promoting participation across the construction supply chain in the formulation of complementary state and municipal legislation within the scope of the National Solid Waste Policy. To this end, a standing National Coordination (Coordenação Nacional) should be established by the sector to track the issue at the three legislative levels (municipal, state, and federal). In addition, the sector should participate in the review of CONAMA Resolution 307 for the purpose of making the necessary adjustments to the National Solid Waste Policy;
- mapping the difficulties and obstacles to licensing procedures for transshipment and sorting areas, recycling activities, and the implementation of landfills throughout the national territory. Based on the survey, guidance manuals should be prepared and actions undertaken with municipal administrations to expedite the implementation of municipal waste management policies. Municipal governments and outsource companies without quality systems should receive the necessary training, based on the legislation enacted, in every Brazilian state capital by 2014; in cities with populations of up to 300,000 inhabitants by 2018; and in cities with up to 100,000 inhabitants by 2022. In this context, emphasis must be given to the dissemination of the Standard on Civil Construction Landfills (Norma de Aterro da Construção Civil – NBR 8419/92/ABNT);
- implementing a computerized waste management system encompassing the entire waste generation, transportation, treatment, and processing network by 2014 in Brazil’s state capitals; by 2014 in cities with populations above 300,000;
inhabitants; and by 2022 in cities with more than 100,000 inhabitants. A nationwide online dissemination tool should be implemented to give publicity to the pertinent good practices;

- endeavoring to ensure the sector agreements provided for under the National Solid Waste Policy effectively establish reverse logistics between industry suppliers in respect of all construction waste, with an emphasis on those most commonly found in construction sites, notably waste classified under CONSAMA Resolution 307/2002 as B category (casings, plaster) and D category (paints, oils, solvents, waterproofing materials, batteries, and others) materials; while ensuring compliance with the specific sector agreements for each category of products.

4.2.6 Actors

There are four major groups representing the domestic sectors mobilized to participate in the Sustainable Construction Program.

- **Executive Branch** – Governments (municipal, state, district, and federal) and respective administrative areas.

- **Legislative and Judicial Branches** – Three legislative levels (chambers, assemblies, Union) and courts.

- **Supply Chain** – Civil Construction Companies, materials manufacturers, real estate firms, architects, and representative entities, such as CBIC and state associations.

- **Civil Society** – Non-governmental organizations, universities, and the Third Sector and social promotion entities such as SESI and SENAI.

The measures proposed under the Sustainable Construction Program for each segment are laid out below.

**EXECUTIVE BRANCH**

- Integrate runoff management and drainage systems.

- Increase soil permeability, above all in urban environments.

- Train and oversee the management activities of water and sewage concessionaires, with a view to reducing water loss during distribution.

- Undertake a national review of university, technical, and vocational training programs, with a view to introducing the topics of formal employment, quality, conformity, innovation, and sustainability.

- Endeavor to ensure public contracts give preference to the procurement of products and systems with optimal environmental performance.

- Foster public policies to incentivize research and development in innovation (R&D&I), as a means to reduce the consumption of materials.
• Promote use of the Forest of Origin Document (Documento de Origem Florestal – DOF) across the construction supply chain.

• Implement and require the use of materials and products derived from forest management systems in infrastructure and building construction projects.

• Incentivize management systems for the implementation of Master Plans which set forth technical quality criteria and take into account the size and vulnerability of municipalities.

• Incentivize and develop initiatives for the recovery of degraded areas, through public-private partnerships and non-governmental sectors.

• Establish special criteria and procedures in state and municipal environmental bodies aimed at expediting the recovery of degraded areas.

• Prepare inventories of risk areas and degraded areas, ensuring the removal and resettlement of inhabitants, where necessary.

• Implement and stimulate initiative to use IBAMA seized timber in housing and infrastructure projects in rural areas and risk areas.

• Develop and implement tools to produce greenhouse gas inventories for all segments of the construction supply chain.

• Develop and implement a national awareness-raising plan to educate stakeholders and public managers that mitigation solutions extend beyond energy efficiency.

• Promote public-private partnerships to meet targets in regard to the gradual implementation of waste management areas from the state capital level down to the smallest municipalities.

• Map difficulties and obstacles in licensing procedures for transshipment and sort areas, recycling activities, and implementation of landfills throughout the national territory.

• Strive to ensure the agreements provided for in the National Solid Waste Policy effectively establish reverse logistics between industry suppliers in respect of all construction and demolition waste materials and debris.

• Review CONAMA Resolution 307, proposed by the Working Group on Solid Waste (Grupo de Trabalho de Resíduos Sólidos) of the Council’s Technical Sanitation Chamber, with an emphasis on municipal timetables and asbestos disposal.

• Participate in the review of CONAMA Resolution 307 to ensure compliance with the National Solid Waste Policy.
LEGISLATIVE AND JUDICIAL BRANCHES

- Formulate legislation to ensure individual measurement of water consumption levels in new and existing buildings.
- Formulate specific legislation to stimulate energy efficiency in buildings, including tax incentives for equipment, materials, and consumption goods used in the respective projects and by occupants, as well as perform regular energy audits and foster educational projects.
- Formulate specific legislation to stimulate retrofits in existing buildings and equipment (public and private) and incentivize the mandatory use of seals in retrofit projects beginning in 2018, with a view to establishing a national renovation program to increase energy efficiency in existing buildings.
- Formulate public policies that are in line with the real needs and interests of urban inhabitants and value good practices and municipal actors in areas such as health, transportation, education, the environment, housing, and sanitation.
- Formulate specific legislation, including within the pertinent building codes, setting forth quality and conformity criteria and indicators and provisions aimed at preventing climate change impacts.
- Push for the inclusion of emission mitigation and climate impact adaptation measures in environmental licensing procedures for construction projects.
- Develop complementary state and municipal legislation under the National Solid Waste Policy.

SUPPLY CHAIN

- Develop and implement a handbook of good practices with guidelines on rational water use by 2014.
- Implement regional capacity building, educational, and awareness-raising programs on rational water use for all construction professionals, other actors, and consumers beginning in 2011.
- Map and disseminate good practices in the adoption of legal verification, socioeconomic responsibility, conformity, and quality criteria.
- Stimulate self-regulation by companies for the purpose of ongoing verification of compliance with the law and adoption of professional training, product, and services criteria.
- Perform socioeconomic mapping to identify the scope of demand for capacity building, educational, and awareness-raising programs in safety, the environment, innovation, and sustainability.
- Establish partnerships between trade unions and business associations for the purpose of implementing a National Capacity Building Program, with emphasis on specific educational and professional training needs in the various regions.
• Build capacity of multiple actors and consultants in the supply chain in respect of intelligent and high-efficiency buildings.

• Map and disseminate construction systems and tools for projects, in order to reduce material losses in the respective processes.

• Promote proper determination of Forest of Origin.

• Promote use of the Forest of Origin Document (DOF).

• Implement and require that the entire sector to use materials and products in infrastructure and building construction projects derived from forest management practices.

• Promote and implement capacity building initiatives for companies across the supply chain to ensure responsible procurement of legal timber, including through the development of educational materials and implementation of training programs.

• Incentivize and develop initiatives aimed at the recovery of degraded areas, through public-private partnerships (PPPs) and non-governmental sectors.

• Develop and implement tools to produce greenhouse gas emission inventories for all segments of the construction supply chain.

• Participate effectively in the Climate Forum/Brazilian Forum on Climate Change.

• Promote public-private partnerships to achieve the targets set out to achieve gradual implementation of waste management areas from the state capital level down to the smallest municipalities.

• Encourage the participation of the entire construction supply chain in the formulation of complementary state and municipal legislation within the context of the National Solid Waste Plan.

• Implement a standing National Coordination for the sector to track Brazil waste policies at the three legislative levels (federal, state, municipal).

• Participate in the review of CONAMA Resolution 307 to ensure compliance with the National Solid Waste Policy.

• Undertake and follow up review of CONAMA Resolution 307.

• Map difficulties and obstacles in the licensing process for transshipment and sort areas, recycling activities, and implementation of landfills throughout the national territory.

• Prepare guidelines and work with municipal administrations to streamline the procedures for implementation of municipal waste management policies.

• Disseminate the Standard on Civil Construction Landfills (NBR 8419/92/ABNT).

• Implement an online management database for the entire waste generation, transportation, and treatment and disposal chain.
• Strive to ensure the agreements provided for under the National Solid Waste Policy effectively establish reverse logistics between suppliers in the sector in respect of all construction and demolition waste materials and debris.

CIVIL SOCIETY

• Map and identify the scope of demand for capacity building, educational and awareness-raising programs in safety, the environment, health, innovation, and sustainability.

• Establish partnerships to implement a continuing National Capacity Building Program, with an emphasis on meeting the specific educational and professional training needs in the various regions.

• Undertake a national review of university, vocational training, and instructor capacity building curricula for all professional construction training programs.

• Promote the elimination of illiteracy among construction workers.

• Take measures to reduce incident and accident rates (fatal, with and without discharge) across the construction supply chain.

• Promote use of the Forest of Origin Document (DOF) and strive to implement and require the use of materials and products in infrastructure and construction projects derived from proper forest management procedures.

• Promote and implement capacity building initiatives for businesses across the supply chain in the responsible procurement of legal timber, including through the development of educational materials and implementation of training programs.

• Promote and implement capacity building initiatives for companies across the supply chain in the responsible procurement of legal timber, including the development of educational materials and implementation of training programs.

• Promote and implement capacity building initiatives for companies across the supply chain in the responsible procurement of legal timber, including the development of educational materials and implementation of training programs.

• Incentivize and develop initiatives for the recovery of degraded areas, through public-private partnerships and the non-governmental sector.

• Value good practices and leading municipal actors in areas such as health, transportation, education, the environment, housing, and sanitation.

• Collaborate in the development and implementation of tools to produce greenhouse gas inventories in the construction supply chain.

• Participate in the development of a national awareness-raising plan to educate stakeholders and public managers that mitigation solutions extend beyond energy efficiency.
4.2.7 Conclusion

The Sustainable Construction Program looks to the future: to a time when the construction sector in Brazil is fully harmonized with the concepts of rational use and re-use of natural resources; recycling; energy efficiency; greenhouse gas emission reduction; and solid waste management centered primarily on the goal of full human development.

The idea of sustainability drives innovation, stimulates the search for new technologies, and promotes the rise of new market niches. To this end, the supply chain must necessarily promote a transition in the business model toward the inevitable demands of the contemporary world.

This development stage, as we saw above, is based on the demand for enhanced human welfare, the availability of new solutions, and the sustainable use of natural resources.

Increased energy efficiency in buildings will serve to reduce the pressure for higher investments in expanded electric power generating capacity. The rational use of water and energy will enable the respective economic savings to be directed toward improved quality of life. Further, leveraging of the waste recycling chain in construction and demolition activities will generate new opportunities for jobs and income.

It is important to highlight that this new sustainable production model has already begun generating jobs at a level that successfully merges formal employment, professional skills, and competitiveness.

The Sustainable Construction Program is an initiative founded on convergence and dialogue aimed at enhancing and sharing solutions, with a view to demonstrating for Brazilian society that the strategy constitutes the most viable and effective path moving forward: indeed, the only path.
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