

Sustainable procurement & major events

Life cycle assessment as a tool for consumer choices



INITIATIVE

REALIZATION

PARTNERSHIP



Ministério do
Meio Ambiente



Sustainable procurement & major events

Life cycle assessment as a tool for consumer choices



São Paulo
Program for Public Administration and Citizenship
2015



Programa Gestão Pública e Cidadania

Initiative

United Nations Environment Programme (UNEP)

Realization

Center for Sustainability Studies (GVces) at the Escola de Administração de Empresas, São Paulo part of the Fundação Getulio Vargas (FGV-EAESP)

Partnership

Ministry of Environment (MMA)

Editor

Sérgio Adeodato

Authors

Gabriela Alem
Felipe Giasson Luccas
Luciana Stocco Betiol
Ricardo Dinato
Lígia Ramos
Sergio Adeodato
Mario Prestes Monzoni Neto

Technical Coordination: Fernanda Altoé Daltro - United Nations Environment Programme (UNEP)

Technical support: Letícia Marselha, Maíra Bombachini Silva, Paulo Branco, Renato Armelin, Susian Martins

Text collaboration: Andréa Vialli

Administrative and communications collaboration: Bel Brunharo, Bruno Toledo, Daniela Sanches, Ricardo Barretto

Graphic design and art direction: Walkyria Garotti

Infographics: Sandro Castelli

Proof reading (Portuguese): José Julio do Espirito Santo

Proof reading (English): Florence Karine Laloë

Translation: Christopher Mack

Publisher: Programa Gestão Pública e Cidadania

Acknowledgments: the Thematic Chamber for the Environment and Sustainability for the World Cup, in particular Cláudio Langone; the technicians, managers and experts interviewed who received us, or who responded to our demands by email; to technicians at SAIC/MMA and UNEP for constant support; the businesses that made themselves available to complete our questionnaires; the GVces technical team for their invaluable contributions.

.....
Sustainable procurement & major events: life cycle assessment as a tool for consumer choices / Gabriela Alem... [et al.] - São Paulo : Programa Gestão Pública e Cidadania, 2015. 136 p.

ISBN 978-85-87426-28-4

1. Sustainable Development. 2. Consumption (Economics) - environmental aspects. 3. Consumption (Economics) - social aspects. 4. Companies - environmental aspects. 5. Special Events. 6. Greenhouse effect (Atmosphere). I. Alem, Gabriela. II. Título.

CDU 658.89

.....
Cataloguing data developed by the Biblioteca Karl A. Boedecker of the Fundação Getulio Vargas - SP.



Programa Gestão Pública e Cidadania

We authorise the total or partial reproduction and disclosure of this work, via any conventional or electronic means, for the ends of study and research, given that the source is cited.

How to reference:

ALEM, Gabriela et al. **Sustainable procurement & major events: life cycle assessment as a tool for consumer choice.** São Paulo: Programa Gestão Pública e Cidadania, 2015. 136 p.

This work expresses the views of its authors and does not, necessarily, represent the perspective of FGV, UNEP or the Ministry of Environment.

Readers interested in communicating with us, or in obtaining all the reports that provided support to this publication may access our website www.fgv.br/ces

Gabriela Alem
Felipe Giasson Luccas
Luciana Stocco Betiol
Ricardo Dinato
Lígia Ramos
Sergio Adeodato
Mario Prestes Monzoni Neto

Sustainable procurement & major events

Life cycle assessment as a tool for consumer choices



1ª edition

São Paulo

Program for Public Administration and Citizenship
2015



Programa Gestão Pública e Cidadania

The United Nations Environment Programme (UNEP) has a long history of promoting Sustainable Procurement, aware of the importance of this tool as being fundamental to the transition into more sustainable patterns of production and consumption. At the same time, UNEP recognises the potential of major events – where everything is superlative in terms of demands and scale – for engage the market and create new concepts in the social imaginary.

Bringing these two tools together with sustainability in mind creates an immense power to elicit change. The realisation of more sustainable events, by procuring products and services with this characteristic, promotes new scenarios and leads to the development of alternatives which will, eventually, be available to end consumers.

A method is required if this is to be the case, however. The definition of which products and services are more sustainable and adequate for major events – and, also, to everyday procurement of public and private institutions – will emerge from an ongoing discussion which has yet to arrive at a consensus. Methodologies continue to be tested by UNEP and other international and national entities in search of processes with technically correct results, and which are accessible to institutions for their decision-making processes. In an innovative initiative, the Ministry of Environment and UNEP have joined forces along with the expertise of the Centre for Studies in Sustainability at the Fundação Getúlio Vargas in order to apply the methodology of Life Cycle Thinking to the study of seven items relevant both to major events and everyday institutional purchases, in search of answers to this question.

This publication assembles these studies, carries out an important discussion with regards to sustainable procurement and major events, and presents the analysis of a range of mega events which have taken place in Brazil in terms of their initiatives on sustainability. Ultimately, the aim is to deliver not only a demonstration of an accessible methodology to define more sustainable products and services, but also the reinforcement of this new perspective on the planning behind institutional procurement, taking into account the life cycle of the goods acquired in order to establish a “better price” in terms of avoiding impacts.

The hope is that this publication will be of great use to decision makers in all institutions at all levels – from the consumer, via technical experts, all the way up to policymakers themselves – inspiring them to permeate tenders and policies with sustainable values.

Denise Hamú
UNEP representative for Brazil

The publication of the book “Sustainable Procurement & Major Events: Life Cycle Assessment as a tool for consumer choices” was developed based on a historical scenario that was particularly significant for Brazil. As host for the 2014 World Cup and the 2016 Olympics, which the country is currently preparing itself for, the country must call on a vast gamut of learning experiences capable of giving scale to social and environmental practices integrated within a new approach to managing mega events which leave behind a legacy for society.

This theme is directly related to the global debate on sustainable consumption and production, as well as the limits to using the planet’s natural resources, as noted in chapter one. From rock’n’roll concerts to major sporting and cultural events, take the opportunity to move forward on sustainable procurement is imperative for public authorities, and is becoming enforced through the creation of legal regulations, voluntary practices and the decision of governing bodies that are concerned about the impacts of government procurement on the environment and on society.

The debate is strategic for the business sector, which has seen exponential growth in the instruments of self-regulation related to their roles both as suppliers and as consumers of products, goods and labour which have sustainable attributes, one of the key points highlighted in this book.

Furthermore, this book represents a major contribution to society by introducing, in a didactic and accessible manner, a technical tool designed to assist the decision-making processes of public and private buyers: the Life Cycle Assessment (LCA), focused on the carbon footprint - the measurement of levels of greenhouse gases (GHG) emissions. This tool assists decision makers who are looking for information about

where their acquisitions impact, helping them to opt for an alternative in line with environmental considerations. In response to demands made by the National Policy for Climate Change and Solid Waste, the carbon footprint allows for the identification of the peak incidences of greenhouse gas emissions at every stage in a product’s life cycle, from the extraction of raw material, via production, distribution, and use, all the way up to the product’s end-of-life. As such, it is a powerful tool, not only in the management of consumer choices, but also as a means of developing the market in the search for productive practices that are less “carbon intensive”.

Moreover, it is possible to verify the benefits that movements such as these provide for the end consumer, who will have products and services better attuned to their choices, contributing to a virtuous circle which makes sustainability integral to consumption.

The reader will also encounter a mapping out of social and environmental practices adopted by major global events which gives dimension to the potential and the force of this activity as a catalyst for change in patterns of production and consumption, within the perspective of a more sustainable and inclusive future for humanity. Through its innovative approach thanks to the inclusion of infographics and illustrative didactic diagrams, this work presents the theme of sustainable procurement in a way which will guide administrators and contribute to public and private initiatives, revealing the necessity for investments in technical tools such as the LCA in the decision-making process.

Luciana Stocco Betiol
Coordinator of the Programme for Sustainable Consumption
Center for Sustainability Studies
Fundação Getulio Vargas

1	Major events and the social and environmental challenges for the planet	10
	From sport to music, the contribution of major events for advances in sustainability	
2	The force of the laws and norms that induce sustainable procurement	38
	A manager's guide to the instruments and criteria for decision-making	
3	A new look at decision-making	70
	The 'life cycle' perspective in the search for the 'best' price	
4	Legacies for a mega-diverse country	116
	The path to the consolidation of sustainable consumption	
	Glossary	129



Major events and the social and environmental challenges for the planet

From sport to music, the contribution of major events for advances in sustainability

In the second decade of the 21st century, humanity faces the challenge of putting into practice the intention to build a more sustainable and inclusive world. This agenda, so heavily debated in recent years, is complex and demands an ongoing process of maturation, learning and dialogue. The objectives are transformative: investing in changes in production, reducing inequality, adapting lifestyles, and in the end, providing economies of scale to solutions consistent to the planet's environmental, social and economic dilemmas.

The list of what is necessary to improve quality of life – in all its forms – and

guarantee the availability of resources essential to production in the present and the future is diverse. The questions are just as numerous as the diversity of landscapes, climates, cultures, and expectations for development, that exist in countries such as Brazil. In the spotlight are the population's increasing access to consumption, the need to generate more energy, to expand the production infrastructure and to continue advancing in the search for a more just and equal society with improvements to basic services.

In the context of this search, it becomes essential to recognise the interdependence between man and the environment based on the understanding that everything is connected in cyclical systems, and that consumer choice, through the procurement of services or purchases by individuals or institutions, are driving forces for how these cycles will take place – be it in terms of the volume procured, the frequency, or the quality and type of resources employed.

Due to the power of scale, institutional procurements undertaken by governments and businesses exert significant influence on the market in terms of the viability of investments in innovation and the gradual step change of sustainability in the manufacturing, use and disposal of products consumed on a large scale – from coffee cups to computers, vehicles, and industrial machines. In the context of megaevents, be they sporting, cultural, musical, scientific or religious, the effects multiply and take on force encompassing yet another key player – the citizen. This occurs not only through the volume of procurements themselves, but also in adopting new management styles together with suppliers and qualifying decision making processes based on criteria that go beyond prices alone.

These procurements include football shirts, marathon running shoes, food and drink served at shows, promotional flyers, furniture, construction of stadiums and housing for athletes, urban mobility – indeed, every detail surrounding a large scale event represents an opportunity of sustainable procurement and a chance to refine tools to refine political or technical tools, such as the Life Cycle Assessment, so that a more far-reaching and efficient approach to consumer choices becomes incorporated into investments in the public and private sectors.

In addition to the contributions to culture, entertainment, scientific knowledge, the development of sports and social dialogues, the sheer scale of these events can also serve as a vehicle for demonstrating materials or practices oriented towards sustainability, as well as leaving behind improved urban infrastructure and creating opportunities for social inclusion. In short, major events have the potential to disseminate concepts of sustainable life and consumption among millions, perhaps billions of people, when one considers the promotional scope these events have via television and social networks.

The magnitude of a mega event is defined not only by the number of participants present, but also by its characteristic ability to transcend physical and geopolitical barriers to reach a global audience, both through the movement of people around the globe, and via the exchange of information and media coverage which reaches the entire world.

Without regard for geographic boundaries that limits the host location, the impact on people's memories, on the economy, on the ecosystems and on the infrastructure, also stretch the time frame beyond the period in which the event actually takes place. The news that Brazil would host the 2014 World Cup came in 2003; the beginning of the life cycle of this event. The production period lasted 11 years until the moment arrived for 'execution' and celebration, over a period of one month. Ultimately, after the end, the tournament continued to manifest itself in the collective memory – particularly due to the result of the semi-final which saw Brazil leave the event – and as result of the legacy of the interventions that took place. In the same sense, the 2016 Olympic Games has a production phase of nine years, starting in 2007, when Brazil was chosen as the host country.

Just as the memory does not fade when the referee blows the final whistle, or when the lights go up at the end of the show, the waste generated, greenhouse gases emitted, the communities who had to move, the commercial developments, the construction and all the other remnants, amount to the fact that the end of the life cycle of a mega event is almost indeterminate. This challenge leads to a reflection on the marks that may or may not be left behind,

and furthermore, on the importance of decisions that are long term in scope.

When viewed from a business and enterprise perspective, major events have the potential to engage in social and environmental themes, just as is currently the case in diverse sectors of the economy that seek to appeal to consumers and contribute to the reduction of negative impacts on the planet's resources. The current scenario is the result of a long process of global debate about the relationship between man and the environment which has been developed since the UN Conference on the Human Environment in 1972. This meeting voiced criticisms of an economic model which ignored the capacity of ecosystems to withstand the impact of population growth, the pressure on natural resources and increases in pollution levels. From the beginning of the 21st century onwards, the world has gained more effective public policies based on legal frameworks and self-regulatory systems which endorse and promote sustainable institutional procurement (see the 'Continuous Evolution' Timeline on pages 16 to 19).

Public awareness of the environmental crisis has been supported by international agreements which have contributed to forming the scenario in which the national agenda evolves. In 1987 the "Our Common Future" report, developed by the Brundtland Commission, established by the United Nations, reinforced and further expanded on the concept of "sustainable development". The theme dominated the 1992 Conference on Environment and Development, where figures that revealed the inequalities in access to the planet's resources and the negative impact of this, provided cause for major concern.

At this important UN meeting, the Earth Charter and Agenda 21 synthesized promises and objectives debated among countries and the fundamental ethical principles for the construction of a just, sustainable and peaceful society.

The appeal of the carbon footprint, water, energy consumption and the use of renewable resources, came to outline production planning.

Among other key points, the documents emphasised the need for new models for land management, for the relationship between the human beings and the natural world, and sent out the first major warning on the importance of sustainable consumption, a premise that went on to shape the global agenda for development. Stress was placed on the role governments play in changing patterns through acquisition policies, with repercussions in different chains of production.

In the subsequent decades, scientific reports from the Intergovernmental Panel on Climate Change (IPCC), an organisation created by the UN in 1988, confirmed the existence and the risks of the process of global warming, accelerated by human activity that releases greenhouse gases, primarily methane and carbon

Current lifestyles make use of more than half of the Earth's resources and there is great inequality in distribution

dioxide, into the atmosphere. Generation of energy, agriculture, deforestation, and pollution from transport and industry, are the principle sources of emissions. The warnings from successive reports forecasting the negative impacts and financial losses in a scenario of decreased scientific uncertainty, mobilised the planet to mitigate the gases and adapt to climate change narrowing the gap between the economy and the environment, with repercussions for business.

This appeal led to a clearer outline of the multilateral processes of negotiation in different international forums and, in a domino-effect, opened up space for a vision of sustainability - in social, economic and environmental terms – which would gradually become incorporated at the centre of business strategies and public policies.

In 2002, during the Conference on Sustainable Development (also known as the Earth Summit or Rio+10) in Johannesburg, discussions were held on the responsibilities of governments for the impact of public procurement. In 2003 this resulted in the formalisation of a global initiative called the Marrakech Process, which established task forces to create the instruments required to solidify and

apply the concept of sustainable production and consumption by proposing the use of tools and methodologies.

Ten year later, the Rio+20 – meeting organised by the United Nations, took place in Rio de Janeiro with the objective of debating possible paths to a greener and more inclusive economy – kept the debate heated. Within the negotiations, given that the Cleaner Production had already been established based on the principles of so-called “eco-efficiency”, attention turned to the power of consumption as a catalyst for sustainable solutions – now recognised as one of the main tools for achieving this end.

In Brazil, this subject gained force when it became integrated into federal legislation, such as the National Policy on Climate Change, and on Solid Waste, as well as the Law of Public Bids and Contracts. These three encompass the pursuit of sustainable development as an objective, and make explicitly clear that public procurement is a tool for achieving this aim. In the same year, this issue was incorporated into norms for federal public administration, together with the Ministry for Planning, Budget and Management when they established, for the first time, a list of criteria of sustainability for procurement.

The evolution of policies and legal instruments for legal security in the use of new patterns has as a milestone the Action Plan for Sustainable Production and Consumption, launched in 2011 by the Ministry of Environment, which outlined six priorities: sustainable public procurement, sustainable retailing, education for sustainable consumption, increased recycling of solid waste, sustainable construction and the Environmental Agenda for Public Administration (A3P).

In facing the risks and the pressure from the market and civil society, as well as the establishment of new legislation to regulate the use of natural resources, consumption and its impact, the perception is that social and environmental issues have come to have greater influence on decision-making processes - this includes procurements made on behalf of the government and private sector. The requirements specified in public procurement, or the definition of suppliers in industry, or a supermarket chain, increasingly take into consideration environmental performance, as well as long term costs that are not necessarily accounted in the final price.

Continuous evolution

The legal framework and self-regulatory systems that have outlined institutional sustainable procurement





The realisation of major events is not distinct from the movement and the premises that define the much-discussed “new economy”. The organisation of the 2014 FIFA World Cup and the expectations around the Olympic Games in Rio de Janeiro in 2016 have led to a far-reaching debate on the opportunities and legacy such events may generate for any one nation. The list of possibilities is extensive, both in the public and private sectors: promotion of the country’s image, reinforcement of activities practiced by the existing administration, the growth of businesses and possible new commercial agreements and relations in international politics, sponsorship rights, the possibilities of advertising, broadcasting or media coverage rights, the registration and exploitation of brands,

The evaluation of impacts throughout a product’s life cycle stands out as a tool for making procurement decisions

promotion of the host cities and countries involved, potential profits in the hotel sector, gastronomy, real estate, civil construction and their respective value chains.

The potential for transformation, possible advances, and benefits for the population in general, such as improvements to urban infrastructure, is extensive. Although this potential is recognised, in addition to the demands, discussions, and values tied into the promotion of meetings of large groups of people who gather together for a common goal, it is also essential to be aware of another important aspect: the legacies generated by a mega event.

In order for the benefits to be long-lasting and accumulate value for the country and its population, beyond the investments and planning at the initial stages, it is also necessary to guarantee that the context of the event is aligned with the public agenda for development in the host location, ensuring a dialogue between public and private sectors and, above all, with the third sector and civil society. The project has to be at the service of the city and not the contrary. As such, mega events are able to function as a source of urban trans-

formation through the consolidation of a network of institutions, improvements, the incorporation of the logic of planning, and a strengthening of civil society’s engagement in the event!

It is worth noting that the strategy designed for an event may also serve as the basis for another. Previous experiences accumulated by other cities and countries can contribute as a starting point for the discussions and planning of a new event, whilst always taking into consideration aspects unique to the location: the degree of economic development, political structure, specific urban issues and cultural differences.

Emblematic global events


It is interesting to evaluate the previous experiences of major events that have already taken place and the planning under development for those that have yet to occur. In the following table, events which have occurred or which will take place between 2000 and 2020 are listed with an assessment of the sustainability activities serving as a point of reference and reflection¹.


Of the 52 major events identified, just eighteen have presented official public documents on sustainability, either as pre-event plans or post-event reports. The sustainability plans describe the measures to be taken to reduce negative impacts on the community, environment, workers, and spectators, among others. The sustainability reports are written after the event takes place and describe the environmental, social and economic performance of the event by means of indicators. Despite plans and reports having different communication objectives, both may be used to identify the way in which an organisation views and prioritises themes related to sustainability.

¹All information was taken exclusively from official documents related to the sustainability of events, this information not having been verified or audited as published by the organisers or indeed in terms of the effectiveness of the proposed actions.














































The eighteen events with corresponding documents on sustainability demonstrate the recurring themes previously considered (waste and water management, the search for alternative sources of energy and environmental compensation, etc.) yet they vary considerably in depth, in the scope of local operations, in the way they communicate the results, and the level of the information presented. The sustainability plans and reports of the eleven events hosted outside of Brazil reveal themselves as more complete and well-structured, opening up space for incentives and evolution, both in their implementation and in the reports of activities related to the events hosted in Brazil.

That said, the seven major events which took place in Brazil may serve as a reference for other projects that intend to integrate sustainability into their planning and execution, with activities related to waste, energy, water, local articulation, among others. (See the table 'Large scale initiatives help to replicate experiences in sustainability' on pages 30-33).

 Events with official documents on the theme of sustainability, as a (pre-event) plan or (post-event) report with activities developed on the occasion

 Events without documents on the theme

Event classification ^{ii, iii, iv}	Attendance
Small	Up to 25,000 people
Medium	From 23,001 to 100,000 people
Large	Over 100,000 people
Mega	International relevance, popular appeal, considerable media coverage with information disseminated to billions of people around the world, significant consequences for the host, a one-off event, never to be repeated

Event	País	Venue	Year	Audience	Event Classification (Scale)	Doc.
Summer Olympics	Australia	Sydney	2000	-	Mega	
	Greece	Athens	2004	-	Mega	
	China	Beijing	2008	-	Mega	
	United Kingdom	London	2012	-	Mega	
	Brazil	Rio de Janeiro	2016	-	Mega	
	Japan	Tokyo	2020	-	Mega	
Winter Olympics	United States	Salt Lake City	2002	-	Mega	
	Italy	Turin	2006	-	Mega	
	Canada	Vancouver	2010	-	Mega	
	Russia	Sochi	2014	-	Mega	
	South Korea	Pyeongchang	2018	-	Mega	
FIFA World Cup	South Korea and Japan	Various	2002	-	Mega	
	Germany	Various	2006	-	Mega	
	South Africa	Various	2010	-	Mega	
	Brazil	Various	2014	-	Mega	
	Russia	Various	2018	-	Mega	
Panamerican Games	Dominican Republic	Santo Domingo	2003	-	Mega	
	Brazil	Rio de Janeiro	2007	-	Mega	
	Mexico	Guadalajara	2011	-	Mega	
	Canada	Toronto	2015	-	Mega	
FIFA Confederations Cup	Japan	Various	2001	-	Mega	
	France	Various	2003	-	Mega	
	Germany	Various	2005	3.359.439	Mega	
	South Africa	Various	2009	3.178.856	Mega	
	Brazil	Various	2013	-	Mega	
	Russia	Various	2017	-	Mega	
SWU Starts With You Music & Arts Festival	Brazil	Itu	2010	150.000	Large	
	Brazil	Paulínia	2011	180.000	Large	
Rock In Rio	Brazil	Rio de Janeiro	2011	700.000	Large	
	Brazil	Rio de Janeiro	2013	595.000	Large	
	Portugal	Lisbon	2012	-	-	
	Spain	Madrid	2012	-	-	
	Brazil	São Paulo	2012	135.000	Large	
Lollapalooza	Brazil	São Paulo	2013	167.000	Large	
	United States	Boston	2004	9.800	Small	
Democratic National Convention	Brazil	São Paulo	2013	1.000.000	Large	
	China	Shanghai	2011	1.200	Small	
Rio+20	Brazil	Rio de Janeiro	2012	-	-	
United Nations Climate Change Conference	Denmark	Copenhagen	2009	33.526	Medium	
Expo 2020	France	Paris	2013	-	-	
Bienal das Artes (Arts Convention)	Brazil	São Paulo	2010	535.000	Large	
	Brazil	São Paulo	2012	520.000	Large	
Bienal do Livro (Book Convention)	Brazil	São Paulo	2010	740.000	Large	
	Brazil	São Paulo	2012	750.000	Large	
Bienal Internacional do Livro (International Book Convention)	Brazil	Pernambuco	2011	603.000	Large	
	Brazil	São Paulo	2013	-	-	
Carnival	Brazil	Rio de Janeiro	2013	-	-	
	Brazil	Salvador	2013	-	-	
	Brazil	São Paulo	2013	-	-	
Jornada Mundial da Juventude (World Youth Journey)	Spain	Madrid	2011	-	-	
	Brazil	Rio de Janeiro	2013	3.500.000	Mega	
Virada Cultural (Cultural Turn)	Brazil	São Paulo	2012	4.000.000	Large	
Virada Sustentável (Sustainable Turn)	Brazil	São Paulo	2013	800.000	Large	

The Potential of major events

An ongoing dialogue, peaceful coexistence among people and social and environmental justice, are part of the broader concept of sustainability. Yet within this sphere, major events have a great deal to contribute, as shown with the social and cultural effervescence at Rio+20, at the Pope's visit to Rio de Janeiro in 2012 and during the 2014 World Cup. From the German national team engaging with local indigenous people in Bahia to the crowd of Argentinians on Rio's beaches, the atmosphere of cultural exchange revealed to the rest of the world the image of a country whose identity was built on the foundation of a mixture of peoples.

The analysis of the events detailed on pages 30-33 shows that the initiatives adopted are in line with the premises presented in international and national documents that offer guidelines on the integration of social and environmental issues into the planning, organisation and execution of events in this area.

Beyond aspects such as the management of greenhouse gas emissions, water and waste, which are directly related to the environmental context, there have been interesting experiences in terms of civil society's engagement in the process of developing sustainability plans for events. One example is the combined development of activities in preparation for the Olympics in Beijing, which brought together an organising committee for the games, state and federal government authorities, NGOs, and international organisations. For the London Olympics, there was social participation to the development of tools to manage, assess, and report on sustainable activities.

For the national events, sustainability activities were structured largely around environmental themes such as waste and energy management. In terms of social-economic themes, there had been a recurring concern about the management of supply chains, and formal guidelines were developed such as the Manual of Suppliers for the SWU Music & Arts Festival (acronym: *Starts With You*).

Advances have been made and although major steps have been taken in regard to considering sustainability in mega and major events, there are still

opportunities to implement new initiatives, especially social and economic that contribute to local development. It is possible to learn from international experiences, particularly related to the planning of these events, focusing on involving civil society and building a positive and permanent legacy.

Procurement management with social and environmental attributes is an ongoing process of experiences and lessons learnt over time through trial and error. This is primarily the case for large scale events that demand more complex infrastructure and long term planning. One concern is to ensure scale in manufacturing and access to products distinguished by these attributes, which depends on how the market behaves and on the existence of regulations and economic incentives. In this sense, major events reveal themselves as opportunities to leverage these experiences, bringing benefits to society as much through the physical delivery (infrastructure, jobs creation) as through the example of conduct, and could offer a positive legacy beyond their end-of-life, based on an agenda of sustainable consumption and production.

All of this forms a context favourable to innovations that respect nature and social and cultural standards, specifically in light of the challenge of economic development within new models which are constantly being debated worldwide. A new multilateral round of negotiations on climate change is foreseen in 2015 with the possible establishment of sustainable development goals by the UN. Large businesses and governments, including the Brazilian government, are moving ahead with the process by establishing a series of commitments to a 2020 horizon. Along the way, a mega event is set to take place which is capable of bringing with it new contributions to sustainability practices: the 2016 Olympic and Paralympic Games in Rio de Janeiro (*read more about the opportunities related to the 2016 Games in chapter 4*).

The country of carnival, football, musicality and diverse cultural expressions has the potential to be a champion on this issue. The learning process evolves. From the World Cup, in which the country was the centre of international attention, to the Olympics which have yet to come, major events can be efficient catalysts towards a more just, inclusive, sustainable – and why not? – happier world.

Event sustainability requirements²

Over the last few years, the events industry in Brazil has passed through a process of consolidation and has shown strong expansion. Gradually, it has also been responding to market sustainability demands, as well as in other sectors, triggering a process of taking increased responsibility for the impact directly caused by events and their supply chains. Advances in global discussions have resulted in norms and guidelines which describe activities related to the theme. The requirements and issues identified in these references have been used as a basis for analysing sustainability initiatives for events hosted in Brazil. The ABNT's Ecolabel for Sustainable Events has been chosen as the main standard as it presents the closest content to the reality of events organised and hosted nationally. Considering that it is a tool for self-regulation, it is expected that there is potential to become a practice more widely adopted by the market and, hopefully, an inspiration for the development of public policies.

● **ABNT – Ecolabel for Sustainable Events^v**. The ABNT's programme for environmental labelling is voluntary, incorporates diverse sectors and seeks to communicate to consumers that a specific product or service has met a series of criteria for environmental performance. Regarding the Ecolabel for Sustainable Events, the criteria include environmental, social and economical perspectives and was designed in such a way that it is applied to any type of event (from meetings to sporting events), despite their location. The programme is in line with ISO norms related to environmental labels as well as other management systems, life cycle assessment, and technical norms related to the classification of solid waste. One of the references was the international norm ISO 20121 (Event Sustainability). The criteria established for the procedure are related to themes such as:

- Compliance with environmental, occupational health, security, and labour legislation
- management of materials, waste, water, energy, carbon emissions and transport
- engaging the local community
- prioritising procurement of local suppliers

● **ISO 20121 – Management Systems for Event Sustainability – Requirements and Guidelines for Use^{vi}**. Based on combined efforts in the events sector at a global level, this is a norm for voluntary certification that proposes a critical survey, seeking to identify negative impacts and strengthen positive ones related to opportunities that arise from events. This comes with the aim of creating a management system to improve event sustainability on different scales and in different geographical regions and cultural contexts. Launched in 2012, the norm encompasses the three dimensions of sustainability and the supply chain, and considers issues related to event organisers, staff, value chains, participants, regulatory bodies and communities. One of the expected results of its application is the improved communication between interested parties in terms of the environmental, social and economical impacts generated by the event. As it is a management system ISO, it possesses a continuous structure for improvement (PCDA – Plan, Do, Check, Act) and is aligned with norms such as ISO 9001 (quality management systems), ISO 14001 (environmental management systems), ISO 26000 (social responsibility systems), SA 8000 (social responsibility) and OHSAS 18001 (occupational health and safety).

● **UNEP-ICLEI – Green Meeting Guide^{vii}**. Developed in 2009 through a partnership between the *United Nations Environment Programme* (UNEP) and ICLEI – Local Governments for Sustainability, the motivation for this initiative came from an internal demand from the UN itself, acknowledging the fact they are responsible for a large number of events on different scales worldwide. The document was developed with a focus on events that take place more frequently, specifically, small and medium events of up to 200 participants. Didactically structured, the guide presents justification for adopting sustainable practices and includes a checklist in order to verify and evaluate performance. The content covers themes such as:

- questioning the real need for staging the event
- sustainable practices adopted in the hotel sector and catering services to be procured

● **GRI – Sustainability Reporting Guidelines and Event Organizers Sector Supplement (2012)^{viii}**. The Global Reporting Initiative (GRI) is a non-governmental organisation, a reference in establishing directives for the development of sustainability reports and is used on a voluntary basis by businesses worldwide. It also develops sector supplements to encompass particular aspects of certain

²The complete technical report with all references is available at www.fgv.br/ces.

sectors, such as the sector supplement for event organisers. The document was created to meet the growing demand for transparency in different types of events based on a complete life cycle perspective, from the conception to post-event stages. The report can be made during the planning phase as a guide to foresee the impacts that it will cause, and also to report on indicators measured after the event itself takes place. The reflection that stems from the creation and measurement of these indicators provides important input for the management of the social, environmental and economic impacts of events. Some relevant points are related to:

- Selecting the venue for the event
- Creating value as a result of sustainability initiatives
- Selecting suppliers, planning and management of the legacy
- Accessibility initiatives

With the aim of facilitating the visualisation of the process of meeting the requirements of the ABNT's Ecolabel for Sustainable Development in events hosted in Brazil, a comparative table has been developed presenting the ABNT requirements alongside relevant and additional aspects presented by the other documents of reference (UNEP, GRI, ISO).

In the UNEP document, attention is drawn to the evaluation of the very need for the event, in order to entirely avoid the negative impacts. Other important aspects are: the choice of accommodation services with requirements for the resources and waste management, and the attention to the composition of cleaning products used in these establishments, catering services which use seasonal food, and giving preference to organic and local farming.

In the GRI Sector Supplement for Events, the concept of transparency stands out as being intrinsic to sustainability reports and as an important tool in the dissemination of practices and businesses performance along with interested parties. Another relevant indicator is the evaluation of the supply chain, which must take into consideration the main impacts on the economy, society and the environment, focusing on actions to address these issues.

ISO 20121 brings in a commitment to the sustainability of the event, represented by a sustainability policy which must be established and documented by company directors at the very outset of the process. This norm also involves the evaluation of risks and opportunities which allows for identification of the positive and negative effects which may result from the event.

Sustainability in Brazilian events

Event		SWU		Rock In Rio		Rio+20
		2010	2011	2011	2013	2012
Requirement		Itu	Paulínia	Rio de Janeiro	Rio de Janeiro	Rio de Janeiro
ABNT	Management of materials used	Wood				
		Paper				
		Canvases				
		Recyclables				
		Compost				
	Restriction of dangerous substances	Paints				
		PVC				
		Regulation				
	Waste Management	Waste sorting				
		Information Technology				
	Energy Management	Natural lighting of equipment				
		Alternative sources				
	Water Management	Monitoring/Participation				
		Reuse				
	Carbon Management	GHG Inventory				
		Publication of emissions				
		Compensation				
	Transport Management	Transportation with control over emissions				
		Collective transport or alternatives provided				
	Social and cultural requirements	Local communities				
Security and health						
Adherence to labour regulations						
Economic requirements	Local suppliers					
	Cooperatives and local recyclers					
	Food and beverages from local areas					
UNEP	Evaluation of the very need for the event					
	Accommodation					
	Catering services					
GRI	Initiatives for accessibility					
	Initiatives for procurement and the impact of suppliers					
	Transparency					
ISO 20121	Sustainability Policy					
	Steps for addressing risks and opportunities					
	Sustainability objectives for the event					

The theme has been considered

The theme has been partially considered

Large scale initiatives help to replicate experiences in sustainability

Some social and environmental highlights presented in recent mega events

SWU Music & Arts Festival – Starts With You	
Year/Event	2010 and 2011
Location	Interior of Estado de São Paulo (Itu and Paulínia).
Description	Music festival which took a broad look at the question of sustainability and raising awareness
Comments	In the analysis of the 2010 festival in Itu and the 2011 event in Paulínia, the sustainability reports (SWU, 2010, and SWU, 2011) were used within the GRI framework and based on the sector supplement for events. The analysis of the documents was carried out in an integrated manner, comparing the main steps taken in 2010 in comparison with 2011 since the propositions were extremely similar.
Social and environmental features	<ul style="list-style-type: none"> ✓ The use of certified recycled or recyclable materials ✓ The use of water or ceramic-based paint for painting structures ✓ The use of electric cars or wheelbarrows to remove waste from the arena and take it to the central disposal ✓ Delivery of pre-compacted and weighed waste to cooperatives in the region ✓ The use of light shades made from plastic bottles filled with water generating luminosity equivalent to a 60 Watt bulb ✓ The creation of an inventory of greenhouse gases emissions based on the GHG Protocol methodology ✓ The development of a Suppliers Manual, listing the criteria which must be met prior to procurement, such as complying to labour laws, and health and safety regulations ✓ Prioritising procurement of local suppliers and activities for the local community's development

Rock in Rio	
Year/Event	2011 and 2013
Location	Municipality of Rio de Janeiro
Description	Music festival
Comments	A Sustainability Plan was presented, both for the international and national events.
Social and Environmental features	<ul style="list-style-type: none"> ✓ Priority given to acquiring plastic products made from recycled plastics or bio-plastic and for materials with environmental certification without chemicals that are harmful to the environment and that have environmental labels ✓ Planning of transportation and logistics, leading to a reduction in the distances travel and the number of trips made as well as instruction for transporters in terms of defensive and efficient driving, reducing fuel use and the emission of greenhouse gases ✓ Priority given to local products and suppliers ✓ Priority for local, healthy food farming

FIFA World Cup	
Year/Event	2014
Location	Brazil, specifically the twelve host cities: Rio de Janeiro, São Paulo, Belo Horizonte, Brasília, Cuiabá, Curitiba, Fortaleza, Manaus, Natal, Porto Alegre, Recife and Salvador
Description	Main international competition for a single sport, ran by the leading men's teams from the 208 federations affiliated with FIFA
Comments	Sustainability activities foreseen for the twentieth World Cup were included in official programmes of Brazil's Federal Government, FIFA and independent third sector initiatives. The conceptual document on the sustainability of the event was used for analysis, based on the ISO 26000 norm for social responsibility which with its sixteen pages approaches general themes about the event such as: vision, mission, principles, strategic planning and strategic objectives.
Social and environmental features	<ul style="list-style-type: none"> ✓ Establishing FIFAs strategic objectives which connect the event's occurrence to themes of public interest such as transparency, human rights, environmental awareness, security and fair work conditions, with a view of leaving a positive legacy for society ✓ Event governance, in which the Managing Committee is directly connected to the sustainability structure of the Federal Government and the Thematic Chambers ✓ Promoting business opportunities with organic and sustainable products ✓ A variety of initiatives from civil society, in addition to government initiatives in terms of their approach and the range of activities, with a view to their integration with the initiatives for the 2016 Olympic Games

United Nations Conference on Sustainable Development Rio+20	
Year/Event	2012
Location	Municipality of Rio de Janeiro
Description	Having had its first meeting in 1992 - Eco 92 – the objective in 2012 was to ensure political commitment to sustainable development. Considering that it was an international conference on the theme, there was a great deal of concern about the organisation and preparation of the event and a team of experts was established to record their experiences, reflections, directives and best practices at the national and international levels in the publication Rio+20 Notes on Sustainability which now serves as a point of departure for events organisers in Brazil. Nine aspects are considered: greenhouse gas management, waste management, sustainable public procurement, and the sustainable management of resources including water, energy, ephemeral construction, transport, tourism and food.
Comments	According to the Rio+20 Sustainability Report, the event involved the participation of the heads of state of 191 nations and was organised in ten different venues throughout the city, with the central hub at Riocentro. The event represented the largest conference ever organised by the United Nations. Given the magnitude of the event, and the subsequent challenges, the Brazilian government instituted by means of Decree (no.7.495, of the 7th of June, 2001) the National Committee for the Organisation of the United Nations Conference on Sustainable Development – CNO Rio+20, an executive body connected to the Ministry for Foreign Affairs, which would plan, organise and stage the event. From the beginning of the project, CNO Rio+20 sought to put into practice a multidisciplinary approach aimed at strengthening the logistical organisation for the Rio+20 Conference with a focus on sustainable development.
Social and environmental features	<ul style="list-style-type: none"> ✓ Development of a waste management plan based on the National Policy for Solid Waste ✓ Orientation and raising awareness among participants in terms of recycling waste ✓ Partnerships with recycling cooperatives to guarantee the appropriate disposal of waste generated by the event ✓ Distribution of natural light through the use of indirect lighting, light shelves and other alternatives ✓ Use of Biodiesel B20 in generators, avoiding the consumption of 280 thousand litres of fossil fuel diesel ✓ Installation of vacuum operated toilet systems with a reduction in water waste of up to 80% ✓ The development by CNO Rio+20 of the document, "Directives for Sustainability for Catering Businesses" with guidelines on sustainable practices in this area ✓ The launch of products that were harvested by hand with the adoption of an agroforestry system that minimises the impact of agricultural activity ✓ Development of "Directives for Sustainability in Accommodation" ✓ Inclusion of criteria for sustainability in procurement

31 st Olympic Games Rio 2016	
Year/Event	2016
Location	Municipality of Rio de Janeiro
Description	Multisport event which includes Olympic and Paralympic events and which is expected to involve the participation of 11 thousand athletes from more than 200 countries over the six weeks of the competition, the event should engage over 100 thousand people including volunteers in preparation and realisation.
Comments	This event is among those that have yet to be staged, but which appear in this analysis due to their relevance, the proximity of their occurrence, and the existence of activities related to sustainability. The effectiveness of these activities, therefore, will only be revealed in the post-event sustainability report. The main document is the first version of the Sustainability Plan for the 2016 Olympic and Paralympic Games, which makes explicit the ambitious goal of demonstrating leadership in the standards for the sustainable management of events in Brazil. A variety of propositions are encompassed across a range of thematic areas. Another feature mentioned in the document, however, is that it is a preliminary document, which may be subject to revision and which still has the potential to be improved in a number of areas. The Rio 2016 Committee, responsible for the organisation, has structured the strategy for sustainability around the ISO 20121 Norm (event sustainability) and it encompasses four principles: responsibility, inclusion, integrity and transparency. In addition to these, among other themes related to social and economic aspects, there are nine priority themes that are part of the environmental agenda: treatment and conservation of water, environmental awareness, use and generation of renewable energy, games that are neutral in carbon use, air quality and transport, protection of soil and ecosystems, sustainable construction and design, reforestation, biodiversity and culture, ecological procurement and certification, waste management.
Social and environmental features	<ul style="list-style-type: none"> ✓ Exclusive use of timber from legal and responsible sources with FSC, Cerflor or PEFC certification ✓ Use of paper products solely from recycled fibres, with the highest possible percentage of post-consumer scrap ✓ The deactivation and environmental recovery of landfill sites and the implantation of an integrated waste treatment system in accordance with the National Policy on Solid Waste ✓ Implantation of waste management plans in construction, guaranteeing adequate waste end management and treatment ✓ Implementation of projects for the environmental recovery of bodies of water ✓ Inclusion and development of micro, small and medium businesses ✓ Providing incentives for the presentation, by suppliers, of certifications such as: ISO 14001, ISO 9001, OHSAS 18001, SA 8000, and/or proof of adopting the directives of ISO 26000 ✓ Development of a strategy for sustainable food and beverages

Experience in sustainable

construction

In addition to February's traditional festivities, in 2014 Brazil experienced the euphoria associated with the World Cup. According to Federal Government estimates, the celebration of the event generated similar figures to Carnival. In the accounts presented by the Ministry of Tourism, R\$6 billion was injected into the Brazilian economy. In the first two weeks of the event, a total of 3.7 million tourists – many of whom were foreigners – passed through the country's twenty principle airports. In Rio de Janeiro alone, hotel groups reported 97% capacity. In total, the twelve host cities for the World Cup received R\$25.6 billion in investments, divided between the construction of stadiums, infrastructure, urban housing, telecommunications and renovations of ports and airports.

Sustainability has become increasingly central to the construction process and the concept is evident in the building or renovation of the twelve sports arenas that hosted the event – some were already certified, others in the process of certification with sustainable construction certificates that advocate the use of cutting-edge environmental technology such as systems for collecting rainwater, the correct disposal waste from demolition, solar and wind power, and architectural designs that take into consideration comfortable temperatures and natural light.

In tandem with this, there were initiatives for compensation of CO₂ emissions generated by the event, in addition to agreements with cooperatives representing recycling collectors for the management and recycling of waste.

Some urban mobility projects focused on collective public transport – there were 45 projects throughout Brazil which included expansions to metro systems, the construction of train and underground stations, express bus connections (BRTs) and light rail vehicles, with a total investment of R\$ 8 billion, R\$ 4.37 billion of which came from federal resources. Compliance to the principles of green construction was a prerogative for the BNDES in the concession of credit for the arenas.

"The impulse towards green construction through a major event will open up new opportunities for reaffirming this stance," according to the evaluation of Henrique Liam, director of Communications and Institutional Relations for Instituto Ethos. "The induction role of the State in the economy is highly expressive. Major transformations come from public incentives and the potential for growth in environmental certification is no exception to the rule" states Liam¹. It is a chance to present to public entities new advances in the process of the inclusion of sustainability as a criterion in public bids, while also generating social benefits and helping to bolster, in the three spheres of government, as well as the private sector and in society in general, a new vision of well-being and quality of life tied into the fair and responsible use of the planet's resources.

¹ LIAM, H. Henrique Liam testimony [2014]. Interviewer: Andrea Vialli. São Paulo: Instituto Ethos. Interview conducted at the Centre for Studies in Sustainability at FGV during the development of this book.

“The occurrence of the 2014 World Cup in Brazil was an excellent opportunity for developing sustainability initiatives, and left behind an important legacy for the country. The initiatives championed by the Thematic Chamber for the Environment and Sustainability allow for joint activities with federal, and state government and host cities, with national scope, articulating sustainability, social inclusion, and the generation of income, and creating the institutional capacity for developing public policies that leverage sustainable production and consumption. Among the principle issues related to the theme are:

- *Certification of stadiums in sustainable construction, which opened up new opportunities for this market in the country on an unprecedented scale*
- *Engagement of the organic and sustainable food market in small scale farming through the Organic and Sustainable Brazil Campaign, with the commercialisation of these products and the supply of organic food to volunteers*
- *Initiatives aimed at compensation and mitigation of emissions, with measures related to the use of greener fuel in vehicles and generators*
- *Adoption of waste collection and uplifting of waste to cooperatives of collectors throughout all context during the World Cup*
- *Promotion of new practices of sustainability in tourism through the Green Passport Campaign*
- *Training in various cities and stadiums for the development of policies for sustainable procurement and purchasing, in some cases including the establishment of new legal frameworks in this field*

In addition to the positive repercussions and the legacy of the institutionalisation of public policies in these areas, the World Cup represented an important learning experience for expanding on and deepening these initiatives for the 2016 Olympic Games.”

Claudio Langone

*Coordinator of the Agenda for Environment and Sustainability for the 2014 World Cup
Advisor to the Minister for Sport*

Chapter Highlights

- Institutional procurement managed by governments and businesses exert significant influence on the market, directing investments in innovation and making gradual changes to sustainability standard in production and consumption.
- The current challenge is the result of a historic process of debate which began in 1972 with the Stockholm Conference, and culminated 40 years later at Rio+20, the UN meeting on sustainable development which emphasised the power of consumption as a catalyst for sustainable solutions.
- Advances in the global debate have generated norms and guidelines on sustainability in major events. One of the main references is the ABNT's Ecolabel for Sustainable Events which contains relevant content to the realities in Brazil.
- The demands of major events result in visibility and opportunities for local production, as well as the inclusion of small businesses in the process of environmental and social sustainability.

The force of the laws and norms that induce sustainable procurement

A manager's guide to the instruments and criteria for decision-making

Not so long ago, the act of making a “good purchase” meant evaluating cost-effectiveness by only taking into consideration price, time frame, and quality. In recent years, however, the frame for the factors to be contemplated in purchases and procurement decisions has expanded, stretching beyond the limits of what can be measured in numbers to become more complex. New rules and strategies have come into play, as a result of four decades of global and national debate on sustainable development, with repercussions for public and private policies (see chapter 1).



123RF STOCKPHOTO

The need to review concepts and find means of production and consumption that are less wasteful of natural resources and less harmful to the environment, to living conditions and human rights, has strengthened the connections between procurement and sustainability. And this is also the case from a normative perspective. This relationship, although still feared and considered nebulous by some, has already been provided by the Public Bids and Contracts Law – Law 8.666/1933, altered in Article 3 by Law 12.349/2010. It includes among its objectives the promotion of national sustainable development, qualifying this as an instrument with broader scope, going beyond attending to specific institutional needs.

By crossing cultural and management barriers, the understanding of the procurement-sustainability interface through the law which governs public procurement only minimally favours the “price, time frame and quality” trinomial and proposes a new perception:

- From “price” to “cost” (accounting for the impact that results from the procurement)
- From “time frame” to “reasonability of delivery time”
- From “quality” to “quality integrated into social and environmental attributes”.

As such, the lowest price will determine the final decision taken from a range of options of suppliers who adhere to these attributes, creating a notion of “better” price for public administration.

This new trinomial combination, which also impacts the business world, has been accompanied by a distillation of the concept of sustainability, and by advances in regulatory and self-regulatory tools, demonstrating an evolutionary process of three aspects of this theme in Brazil: the first, in which the inclusion of sustainability in purchasing and procurements is a movement which violates the norm which governs purchasing and procurements, the second, more current context, in which responsibilities are assumed through the life cycles of products and services, with voluntary compliance with the movement of sustainability as applied to procurement, and a third, which would ultimately make this practice mandatory¹.

Having overcome the notion of the violations of this norm, accountability throughout the life cycle of the procurement depends on the articulation and performance of the agents involved in relationships of consumption and production which generate impacts and act across a range of driving forces. These agents must deliver the development of public policies and social behaviour guided by human and ethical values. One of the key links, therefore, is the individual consumer (citizen) who exerts social control and defends their interests, although without necessarily having sufficient financial means to promote massive transformations in the market. Meanwhile the private sector, confronted with opportunities for innovation and new business opportunities, has the

Consumption becomes a combination of responsibilities shared among governments, businesses and consumers

potential to catalyse the movement towards sustainable development. Public authority, in turn, participates as a major promoter of the theme when it takes on its role as inducer and regulator in a way which integrates other agents and inspires them to use their respective decision-making “powers”ⁱⁱ.

Public procurement presents itself as an inductive tool for changes in market behaviour (production), as the instruments that take social and environmental attributes into consideration are a strong sign that the

State requires innovation, changes, and adequacy of processes. In society this stimulus comes from the “example” that individual consumers (citizens) are provided with. In addition to this, the performance of public authority must comply with the dictates of isonomy, legality, impartiality, morality, equality, administrative probity, abidance by the bid invitation, objective judgment, transparency, and publicity, all in accordance with the Public Bids and Procurement Law.

For businesses, revisiting the traditional procurement processes, in addition to possible reductions to costs, opens the doors to enhancing value by means of good practices and strengthens creative models for management, sustained

by three guiding principles: risk management, the search for efficiency and the creation of sustainable productsⁱⁱⁱ. When adopted by the private sector, the replication of this logic, which imposes a responsible perspective on acts of consumption that is both systemic and strategic, will have serious influence on other agents. As such, procurement, despite being an integrated solution, will include effective costs in an attempt to generate benefits not only for the buyer, but also for society and the economy, which can minimize the damage to the environment.

Consumption stops being a relationship of merely private interest and becomes a combination of shared responsibilities incorporated into private, individual and institutional plans, both in the public and private sector, including the costs and benefits that emerge from actions of prevention and mitigation^{iv}. The State plays a relevant role in these relationships of production and consumption as it possesses duties and powers as a consumer, a regulator and a protector of common interests. However, it will not be successful only by means of regulations. There emerges the need to seek integration, intersectorality, and in the end (or from the beginning), dialogue and consensus among the agents involved.

Legislation and self-regulation

The procurement planning and the creation of institutional procurement directives and/or policies, as well as the elaboration of sustainability attributes – an item presented at the 2nd stage of the procurement guidelines (*see pages 44 and 45*) – all undergo analysis according to the existing legislation and self-regulation which will provide support to the decision-making process.

Over time, new policies, laws and rules helped to overcome conceptual barriers and promote a more contemporary legal understanding of the theme. When faced with a model for development that is focused on economic growth and technological advances, one seeks to guarantee a shift in paradigm. Therefore, it becomes necessary to reinterpret and revise norms, rules and the conduct of production and consumption, informed today by the understanding that we possess a planet with limited resources.

Step-by-step guide to sustainable institutional procurement

What managers and their teams should take into consideration when making decisions

- Visualise and review the objectives, function, and benefits of the product or service to be procured
- Can a product purchase be replaced by the procurement of a service?
- Evaluate whether the purchase is necessary by considering previous specifications that are more appropriate to the needs of the institution

Verification of needs and objectives

Mapping of social and environmental impacts and the creation of procurement attributes

Procurement

- Transform sustainability attributes that consider the social and environmental impact and risks of the product's life cycle, into technical specifications that will be included in the elaboration of the bid notice, and to also include these attributes in the approval and qualification of the supplier and in contractual obligations
- Search for the best price – and not exclusively the lowest price

Market consultation

Having outlined the specifications, it is necessary to:

- Verify if there are suppliers that can meet the demand for low impact products
- When these suppliers do not exist:
 - Hold public meetings or consultations with the market
 - Publish bid books that show interest in products, services and work with sustainability attributes

Having confirmed the need for the procurement, it is necessary to look for ways in which the decision causes the least possible social and environmental impact. It is up to the team to:

- Consider the product or service in terms of its life cycle, contemplating the environmental and social impacts, from the extraction of raw materials, via the production stage, up to disposal.
- Analyse legislation and self-regulation in order to comprehend the practices of sustainable procurement inherent to that

particular product.

- Design the technical specification, responding to:
 - What are the product's attributes or characteristics? (E.g. recycled, mercury-free).
 - What are the product's minimum performance levels? (E.g. energy efficiency, reduced carbon emission).
 - What are the production processes? How is it supplied? (E.g. organic system, certified wood, energy use, procurement of local labour).

Benefits to society

Support from experts

Market and new suppliers

Basic guidelines for the institutional buyers

The public or private buyer should follow guidelines in order to make sustainable acquisitions that meet the requirements of goods, services and work, with benefits not only for the organisation, but for society as a whole. The decision-making process follows a trajectory that starts with confirming the actual need for the product, therefore reducing the demand for the planet's resources, and continues up to the post-procurement monitoring – the stage at which attention returns, in particular, to the quality of the item procured and the destination of the waste that results from its acquisition. Negative impacts should be minimised and positive impacts, maximised. In the end, the purpose is to stimulate the availability of products that have less impact on society and which benefit the individual consumer who in these conditions is able to actively participate in the virtuous cycle of sustainable procurement.

The infographic on the previous pages presents a guide to the steps to be taken by the buyer, but there is nothing to stop some of these stages taking place in a different order to the suggested model. What is important is that these guidelines for sustainable acquisitions are not seen merely as extra benefits, optional to the acquisition. They should be incorporated into the decision-making process with the aim of generating the desired effects, cultivating in the organisation a view of development underpinned by acquisitions with sustainability attributes.

1

At the first stage it is recommended that the procurement manager:

- **Verify the needs and establish the real objectives** of the organisation in carrying out the particular acquisition in which the function and benefits of the product, service or work are clearly visualised.

2

After the need for the acquisition is established, **it is important to identify options that will make the final decision less impactful from a social and environmental perspective**. In order to achieve this, it is recommended that there be an assessment of the potential social and environmental impacts that could result from the procurement. Based on this assessment, the sustainability attributes are identified in order to reduce negative impacts and increase positive impacts.

Some technical tools may assist in this process:

- The use of the Life Cycle Assessment (LCA) (*see chapter 3*).
- Analysis of legislation, technical norms, and business policies (*see chapter 2*).
- Labelling and certification systems.
- Consultations with experts to obtain technical subsidies for decision-making (E.g. LCA studies).

Sustainable procurement practices should include:

- **Attributes** (product's physical characteristics – E.g. recycled, free of mercury).
- **Process** (how the product is made or supplied – E.g. organic product, certified wood, use of local labour or from minorities).
- **Performance/function** (description of the minimum performance level – E.g. energy efficiency, reduction of water consumption, lifespan, etc.).

Based on this information it will be possible to identify at what stage of the procurement the minimum performance should appear: basic design phase, the technical specification of the product/service, in the requirements for the qualification and/or approval of the supplier, and/or in contractual and post-contractual obligations.

At this stage, some buyers may reach the conclusion that it is not worth acquiring the product due to the vast negative impacts it provokes, and that in the long term the purchase would be expensive for the organisation. Furthermore, they may identify the existence of services (rental for example) that meet the requirements of the product without it being necessary to make the purchase.

3

At the third stage, having defined the scope of the procurement, **the market should be consulted to verify the existence of suppliers who meet the established criteria**, quoting prices according to the same social and environmental criteria. When appropriate suppliers do not exist, it is important to engage in communication with the market (E.g. meetings with suppliers, public audiences or consultations) in addition to the articulation of incentives to establish suppliers who are able to meet the demand (tax incentives). The public authority may republish the bidding notice until there is more than one supplier, and it is valid to base this process on a justification of the importance of these demands.

4

At the final stage, which corresponds to the effective purchase, **an evaluation must be made of the quality of supply and afterwards the post-procurement impacts**, analysing, among other factors, the destination of waste that results from the use of the product, even when the product becomes obsolete (E.g. computers).

Consumers who come to assume their roles, alongside an informed and stimulated supply market, may (and should) use their procurement potential to engage in the movement towards sustainable development. In this context, the State, a key player in this process, recognises public procurement as an economic instrument and seeks to value the effective costs of acquisitions aimed at encountering a more advantageous proposal (for society and the environment), taking into account the limits of planetary boundaries.

To facilitate management models that respond to the demands of sustainability, there are economical, educational and information-based regulatory instruments for self-regulation, as well as technical tools, such as the Life Cycle Assessment. From these, purchasing and procurement can promote changes beyond the mere acquisition of products, providing a viable way for achieving environmental protection goals through qualified choices.

Government regulation

The intensity of the international movement for sustainable production and consumption patterns, reaffirmed at Rio+20, in addition to social, technological and informational factors, has attracted a more watchful eye from society in terms of government behaviour, particularly with regard to public spending. This has called for greater transparency, access to information and, therefore, responsibility in choices made by public authorities in terms of their acquisitions, with the aim of avoiding damages to society and the environment. In order to strengthen this movement, beyond the establishment of regulations, there are programmes run by the Federal Public Administration which directly or indirectly impact on sustainable public procurement in Brazil. In addition to the Action Plan for Sustainable Production and Consumption and the Programme for Environmental Agendas in Public Administration (A3P), there are initiatives such as the Programme for Efficiency in Public Spending (PEG), developed by the Secretary for the Federal Budget of the Ministry of Planning, Budget and Management, with the objective of eliminating waste and continuously improving process management, with training for managers and shared experiences on waste management. The Sustainable Esplanade

Project, a joint initiative involving four ministries created in 2012, seeks to incentivise public organisations and institutions to adopt a management model capable of improving efficiency in the use of public resources, incorporating the social and environmental variable into the work environment.

It is interesting to note that there are a range of federal norms that amount to a consistent and minimally technical legal foundation for the implementation of sustainable public procurement and that, alongside the norms that have already been established by other federal entities, there are clear grounds and directions for the implementation of this practice (*see pages 52 to 55 – “Normative frameworks with influence on public procurement”*).

In this context, the Differentiated Regime of Public Procurement (RDC) instituted by Law 12.462/2011, stands out as an important example of regulation, in particular with regard to the consideration of the direct and indirect costs and benefits of procurements, in terms of moving away from the fragmented ‘price tag’ perspective on products and services.

The law is exclusively applicable to procurements linked to the 2013 Confederations Cup, 2014 World Cup works related to the Programme for the Acceleration of Growth (PAC), engineering work and services for the National Public Health Service (SUS) and the 2016 Olympic and Paralympic Games. This legal tool is aimed at introducing promptness and speed into legal procedures, expressly underlining as one of the norm’s principles the pursuit of sustainable national development. To achieve this, the norm includes a range of social and environmental concepts and criteria such as, the consideration of the lowest total cost of ownership of the goods or services to be contracted, with the aim of assessing the positive and negative externalities generated by the acquisition. Another new feature is the possibility of a differentiated remuneration of suppliers,

The country possesses laws and norms that favour public purchasing and procurement with sustainability criteria

linked to the criteria of environmental sustainability, as well as giving preference to local technology, raw materials and suppliers, promoting local development.

All of these guidelines facilitate the elaboration of specifications with the incorporation of sustainability attributes by public buyers and in public procurement. They also contribute when they take into account the logic of life cycle thinking in terms of the product at the time of specification and during the procurement of goods, work and services, further supported by the possibility of using certification systems for product quality or the production process, which are also subject to environmental considerations.

Existing norms support arguments that make it possible to avoid procurement disputes. Managers must be aware of the fact that it is possible to favour proposals that result in savings on energy, water and other resources. Added to this picture is the reduction of social and environmental impacts - taking the examples provided by the National Policy on Solid Waste and the National Policy on Climate Change. These norms incorporate sustainability attributes and reinforce sustainable procurement as an economic instrument which meets the purpose of such policies.

A favourable legal scenario is therefore formed, sustained by a process of experimentation and backed, at a federal level, by the Federal Court of Accounts (TCU). This control body has progressively shifted its position on the interpretation of the principles in the Federal Constitution and has also acted in support of sustainability activities in procurement.

According to analysts, it is necessary to go further. One path would be not only to approve a law that would make sustainable public procurement expressly mandatory, but also norms that provide precise directives on products and services with these characteristics. This measure would give greater legal security to decision makers and would stimulate the private sector to move in that direction, in the knowledge that, at the very least, they would be attending to one major buyer: public authority.

Consumption initiatives in the government sphere generate effects that are multiplied in every production chain, involving concepts of "benefit" related to

the practice of "only procurement what is necessary", avoiding waste and "promoting innovation" in indispensable procurements and in which solutions are needed to reduce their impact on the environment.

Self-regulation by businesses

In addition to the legal foundation for public activities via regulatory instruments that are capable of market influence, the private sector has also been engaged in the theme and participates in sustainable procurement together with its supply chains, inspired by the criteria introduced by voluntary self-regulatory instruments, and has taken the first steps to adopt technical tools to subsidise decision-making, as is the case with the Life Cycle Assessment. Sustainable private procurement point to increases and progress in activities in the private sector that seek to meet social and environmental demands, capable in many cases of bringing about the establishment of norms of a mandatory nature.

Historically, the perception is that from the 1970s until today there have been improvements in business management and in the elaborations of products and services with sustainability attributes, moving away from a reactive posture, focussed on compliance to legislation, towards more proactive preventive activities. Businesses display engagement in the extent to which they comprehend and internalise social pressure, anticipating potential problems. Without doubt the social and political scenario has highlighted that responsibility for social and environmental impact is assumed in light of concepts related to interdependence, favouring decisions aimed at the well-being of society and the business itself.

Shifts in posture in businesses are at times institutionalised in spontaneous and voluntary commitments – known as self-regulatory instruments – which, in general, go beyond legal obligations.

The new conception of more advantageous proposals in procurement includes the social and environmental performance of goods and services

Such instruments are defined, according to the Organisation for Economic Co-operation and Development (OECD)^{*}, as a third category of instruments for management-protection of the environment and represent initiatives assumed by businesses with a view to improve standards and monitor targets to reduce impacts. The main examples are environmental management and auditing, codes and manuals of conduct, commitments to progress, ecolabels, stamps, and certifications (*see the table on pages 60 to 67*).

Norms such as the ISO 26000 series and the ABNT NBR 16001* contribute to the inclusion of sustainability criteria in business and indexes such as the Corporate Sustainability Index (ISE) and the Dow Jones Sustainability Index, which demonstrate an enterprise's performance in terms of the adoption of sustainable practices (*see the description on pages 54 to 55 – "Self-regulation with influence on sustainable procurement"*).

In this context there is, therefore, a new perception in the private sector of its power to direct models of production and consumption by means of sustainable procurement. As a consequence, the themes "procurement" and "relationships with suppliers" appear with greater frequency in business sustainability strategies.

Studies on impacts throughout the production chain, monitoring of natural resources origins (timber suppliers, for example), reduction of carbon emissions, waste and effluents, health and security, the fight against corruption and slave labour, transparency and fair pricing, etc. are recurring subjects in these instruments. What is noted is that businesses play a key role both as buyers and as suppliers of sustainable products and services, influencing a range of production chains.

The adoption of social and environmental practices can be certified with a label that attests to this type of business behaviour. So-called "certifiable instruments" in general demand procedures and detail conduct subject to auditing by a third party. They are viewed as strategic for improvements in social and environmental performance, communication with the market, reduction of risks, enhancing the value of business and products as well as providing a competitive advantage.

* ISO 26000 is a non-certifiable international directive that deals with the socially responsible behavior of organizations, providing incentives to encourage the private sector to go beyond the legal obligations on themes of ethics, transparency, and social well-being. The ABNT NBR 16001, for Social Responsibility, had its 2012 version based on the international directive ISO 26000.

They also facilitate access to information about products, by means of labelling, making it possible for the consumer, be it institutional or individual, to obtain a minimum parameter in order to define the purchase decision.

The pioneering nature of enterprise initiatives in sustainability in the 1990s regarding certifiable self-regulation resulted in the creation of the ISO 14000 series for quality in environmental management and the Forest Stewardship Council (FSC) which established criteria for forestry management. These instruments came to influence institutional procurement, focussing on production processes and supply chains. Since then, there has been an increase in the number of certifications and stamps, as well as compliance with voluntary standards which have contributed significantly to establish models for sustainable production and consumption.

In the dialogue between certifiable and non-certifiable self-regulatory instruments it is clear that they touch on common themes, even when approached from different perspectives. In this sense, the validation of business practices by free and independent third parties allows compliance to sustainability standards to be viewed with greater credibility. The non-certifiable instruments, on the other hand, are self-declaratory in nature. They are different, but both offer directives so that businesses can improve their production practices. As such, there is no need for each organisation to start from scratch when establishing activities.

When diverse businesses use the same self-regulatory instruments based on greater efficiency, a common reference is created for sustainability aspects and a market standard emerges which influences and qualifies the supply chain in terms of meeting sustainability criteria. At the same time, the understanding that these instruments are constructed on the basis of dialogue, social control, and the involvement of different agents in society, which when taken together confer the legitimacy of the process, stimulating greater compliance among organisations. The combination of norms and self-regulatory instruments presented in the following tables, seeks to respond both to the demand for legal and regulatory foundations (*pages 42 to 45*) for justifying a sustainable procurement and also serves to make explicit the sustainability attributes that arise from these instruments (*pages 60 to 67*).

Normative frameworks with influence on public procurement

References for managers to justify sustainable procurement on a legal basis

- **Law 6.938 of 31/08/1981 – National Policy for the Environment:** this law, with grounds in sections VI and VII of Art.23 and Art.225 of the Constitution, establishes the National Policy for the Environment, its goals and mechanism of formulation and application; it established the National Environment System (Sisnama) and the Environmental Defence Registry.
- **1988 Federal Constitution, in particular articles:** Art.37 – principles that govern public administration; Art.70 – principle of economicity, Art.170 – general principles of economic activity, II, IV and VI, Art.173 – regulates the direct exploitation of economic activity by the State, Art.174 – general State principles as economic regulator, Art.225 – norms for environmental protection and the principle of sustainable development.
- **Law 8.666 of 21/06.1992 Public Bid and Contracts Law:** regulates Art.37 section XXI, of the Federal Constitution, institutes norms for procurement and contract in Public Administration and other measures. Particular focus on Law 8.883/1994 which includes alterations to the Public Bids and Contracts Law, including waivers for procurement made by non profit organisations aimed at social reintegration of former prisoners and procurement by (non profit) associations for the physically disabled. It is important to mention that, not excluding activities at a state level, it is the exclusive responsibility of the Union to legislate on general norms for procurement and contracts.
- **Law 9.605 of 05/10/1998 Environmental Crimes Law:** features the criminal and administrative sanctions derived from conduct and activities that are harmful to the environment along with other measures.
- **Law 10.295 of 17/10/2001 – Energy Efficiency Law:** features the National Policy for the Conservation and Rational Use of Energy.
- **Supplementary Law 123 of 14/12/2006 – National Statute for Micro and Small Businesses:** regulated by Decree 6.204 of 05/09/2007 this refers to the favoured, differentiated and simplified treatment of micro and small businesses for public procurement in the area of federal public administration.
- **Law 11.947 of 16/06/2009:** features criteria for school catering with incentives for the acquisition of a diversified range of food types, produced locally and preferably by small scale farms.
- **Law 12.187 of 29/12/2009 - National Policy on Climate Change:** regulated by Decrees 7.390 of 09/12/2010 and 7.643 which also alters Decree 7.390 of 15/12/2011 indicates public procurement as an instrument for achieving the objectives described in the norm.
- **Law 12.349 of 15/12/2010:** alters Article 3 of Law 8.666/93, introducing sustainable national development as an objective in public procurement.
- **Law 12.305 of 02/08/2010 - National Policy on Solid Waste:** regulated by Decree 7.404 of 23/10/2010, institutes the policy and creates the Inter-ministerial Committee of the Nation Policy on Solid Waste and the Guiding Committee for the Implantation of Reverse Logistics Systems and identifies public procurement as an instrument for achieving policy objectives.
- **Law 12.462 of 04/08/2011:** institutes the Differentiated Regime for Public Procurements, exclusively applicable to the 2013 Confederations Cup, 2014 World Cup, PAC constructions, engineering work and services for the National Public Health Service (SUS) and for the 2016 Olympic and Paralympic games, establishing sustainability criteria.
- **Normative Instruction 01 of 19/01/2010:** features environmental sustainability criteria for the acquisition of goods, procurement of services or work by direct, autarchic and foundational Federal Public Administration.
- **Decree 7.746 of 05/06/2012:** regulates, at a federal level, Art.3 of Law 8.666/93, adding sustainable national development as an objective of the Public Bids and Contracts Law.
- **Normative Instruction 10 – SLTI/MPOG of 12/11/2012:** establishes rules for the elaboration of Management Plans of Sustainable Logistics by the Federal Public Administration, referred to in Art.16, of Decree 7.746 of 05/06/2012.

Self-regulatory instruments with influence on sustainable procurement

Exam Guide to Sustainability

Evaluation methodology for sustainability business performance that aims to highlight businesses that comply with a range of practices on commitments, transparency and corporate governance and their performance in relations to financial, economic, social and environmental aspects (GVES, 2013)^{vi}.

Global Reporting Initiative (GRI)

International organisation that supports the elaboration of organisational reports on sustainability with the aim of providing greater transparency by means of principles and indicators that organisations may use to measure and communicate their economical, environmental and social performance (GRI 2013)^{vii}.

Dow Jones Sustainability Index

Indexed on the New York stock exchange, this is an indicator that evaluates the performance of leading businesses in sustainability based on economic, environmental and social criteria. The index serves as reference for investors who integrate sustainability considerations into their portfolios and it provides a platform for engaging businesses that seek to adopt best practices in sustainability (SUSTAINABILITY INDICES, 2013)^{viii}.

Corporate Sustainability Index (ISE)

A tool for the comparative analysis of performance of businesses listed on BM&FBovespa in terms of corporate sustainability, based on economic efficiency, environmental balance, social justice and corporate governance. Expands the understanding of businesses and groups that are committed to sustainability, differentiating them in terms of quality, degree of commitment to sustainable development, equity, transparency, rendering of accounts and the nature of the product in addition to business performance in relation to finance and economics, social, environmental impacts and the effect on climate change (ISE, 2013)^{ix}.

Ethos Indicators for Sustainable and Responsible Business 3rd Generation (intermediary version for pilot-application)

A tool composed of a questionnaire that allows for self-diagnosis in the management and planning of the business in order to make advances under the theme of Social Responsibility in Business/Sustainability. It focuses on evaluating the extent to which sustainability and social responsibility have been incorporated into the business, assisting in the definition of strategies, policies and processes. Although it introduces performance measures, this tool does not propose to identify businesses as sustainable or responsible (ETHOS, 2013)^x.

ISO 26000

Applicable to all types of organisation, it is non-certifiable and seeks to internalise the responsibilities surrounding the impact of decisions and activities on society and the environment, which demands greater transparency and ethics. It presents directives on social responsibility, drawing particular attention to the organisation's compliance with sustainable procurement as a tool for social and environmental protection by taking into account the environmental, social and ethical performance of products or services (ABNT, 2013)^{xi}.

There is a fundamental element in this process that differentiates private and public activity. In the private sector case, there is a channel for communication, monitoring, and support in the development of capable suppliers to participate in activities of improved social and environmental performance. However, there is a gap between public authority and the supply market, despite the existence of clear legislation that drives the search for social and environmental criteria. There are, therefore, procurement companies that present great variety and consistency in their sustainability practices, directly influencing their commercial relationships, which are modified as time goes by. On the other hand, the public sector runs into legal restrictions, not foreseeing robust activities that would

Companies adopt policies for sustainable procurement based on voluntary tools, such as certification

support the development of a more sustainable market. "Win-lose" relationships tend to represent the pattern between institutional suppliers and buyers. One also observes normative challenges and practices that prevail and which must be overcome: the voluntary compliance with sustainable procurement, the absence of a notion of the impacts that result from a procurement decision, the predominance of the conventional (price-time frame-quality) trinomial, imbalances between social and environmental criteria,

the technical capacity of civil servants and the availability of information on social and environmental criteria, the unreadiness of the market, and the absence of qualified suppliers interested in supplying to Public Authorities.

Moreover, there is a deficit of minimum standards for sustainability that should be included among the specifications of products and services that cover concepts such as "ecodesign", "circular economy", and "cradle to cradle". A narrow degree of cooperation among agents, along with the involvement of the industrial and academic sectors, as has been the case in ISO discussions on Sustainable Procurement, for instance, could improve the foundations and

Law on waste stimulates the use of recycled materials

When it installed chairs made of recycled PET plastic bottles, the Maracanã stadium in Rio de Janeiro drew attention to the importance of diversification in the use of recycled materials as a means of developing a market for products that don't end up in dumps or landfill sites.

Of the 70 thousand seats at the arena, 9 thousand contain recycled plastic that came from empty bottles collected during a campaign to deliver waste to recycling depots throughout the city*. Developed by Coca-Cola Brazil, the project involved the articulation of a supply chain, from the recycling collector cooperative responsible for preparing and packing the waste, to the recycling business that transformed it into a new raw material and the creator of the final product, furniture manufacturer Giroflex.

"The demonstrative effect of these solutions is important for the population and the market to understand the potential of waste that we separate at home", affirms Victor Bicca Neto, director of sustainability for Coca-Cola Brazil for the 2014 World Cup. Major events are opportunities for businesses to play their part in complying with the National Policy on Solid Waste based on the principle of "shared responsibility".

In addition to recycled products, the biggest football tournament in the world also served as a platform for introducing the country to a model of refrigerator that is less harmful to the environment. The product, used in the sale of soft drinks, utilises carbon dioxide as a refrigerant gas, conforming to current international labelling. According to Bicca, the Metalrio company has nationalised all of the equipment's components apart from the compressor. The plan is that this technology will become standard practice in the business's operations in Brazil following the event.

*The source of all the data contained in the above text is <http://www.valor.com.br/empresas/3585856/solucoes-verdes-movimentam-cadeia-de-fornecedores>

Evolution of an international debate: ISO – Sustainable procurement

Issues related to sustainable consumption by institutions have gained in importance and strength internationally as a result of the debate about the new ISO norm for sustainable procurement. Globalisation and the connections between economies has shown that the dilemmas faced are similar around the world, indicating the possibility of a single international norm which would make sense in terms of contributing to the integration of principles of social and environmental responsibility into the acquisition process.

The proposal is that the content the norm presents a guideline to organisations for the integration of sustainable development in their purchases, irrespective of their size or activity as described in the ISO 26000 on social responsibility.

The main objectives are:

- Promote and value sustainable procurement
- Improve communication between decision makers and all interested parties
- Promote mutually beneficial relationships
- Integrate into procurement functions the different dimensions of social responsibility as described in ISO 26000
- Be applicable globally to any public or private organisation
- Facilitate the understanding of the “sustainable procurement” concept and make it accessible through a practical and operational approach.

Source: http://www.iso.org/iso/iso_technical_committee?commid=4514815

tools for Life Cycle Assessment and costs to technically equip purchasers and suppliers in terms of the best options. In this sense, the norms come to detail sustainability attributes. – such as the incentive for organic production, and the employment of recycling collectors, a sector which has been supported and standardised with the aim of guaranteeing that the last link in the life cycle chain of a product has the lowest possible impact, or, in the best case scenario, can be reintroduced into the production process.

Today, having just hosted the World Cup and now in preparation for the 2016 Olympic Games, Brazil’s Differentiated Regime of Public Procurement presents an important opportunity to use scale potential in public procurement and the promotion of innovation in value chains. Equally, self-regulatory instruments tend to strengthen and disseminate among businesses, stimulating a virtuous circle of the incorporation of sustainability into production processes and institutional procurement.

For the institutional buyer who is has already gone beyond asking “why make a sustainable purchase?” and has now arrived at the question “how can I make one?” an issue arises: what are the best practices to be adopted in the description of a product or service that is to be acquired with these characteristics? Where can we encounter sources for consultation that will inspire the specification of the object to be procured?

With a view to assisting the decision maker, giving them greater security in the elaboration of their portfolio, the following table is divided into nine macro-themes that include both environmental and social aspects, extracted from environmental public policies and sustainable public procurement, as well as the main self-regulatory tools for businesses engaged in the theme of sustainability. The references highlight items that should be identified in the search for the best acquisition, initiating with the assessment of the physical characteristics that this product or services supplies, passing through its manufacture or supply process and concluding with a description of the minimum expected performance level. Finally, please take a look in the following pages at what to consider when making a sustainable procurement.

A guide to the identification of social and environmental attributes related to the different laws, norms and self-regulatory initiatives

MACRO-THEME	REFERENCES FOR SUSTAINABILITY ATTRIBUTES	REGULATION AND SELF-REGULATION
Local Development	<ul style="list-style-type: none"> § Priority to local labour, materials and technology with the aim of favouring development and avoiding environmental impact in terms of transportation. ✓ In purchases for school catering, preference given to local ingredients and products. ✓ Preference to agricultural and food products from settlements of agrarian reform, traditional communities, indigenous areas and quilombolas, with the possibility of differentiated treatment. ✓ In construction, priority should always be given to making use of raw materials, technology and labour in all phases of the project – execution, conservation and operation. 	<p>CF 88 (Art. 225, § 1º)</p> <p>National Programme for School Catering – Law 11.947/2009 (Art. 14)</p> <p>Decree 7.746/2012 (Art. 4º)</p> <p>Normative Instruction 01/2010 (SLTI – MPOG) (Arts. 5 and 6)</p> <p>Ethos Indicators</p>
Value chain management and engagement with stakeholders	<ul style="list-style-type: none"> § Prohibition of the procurement of suppliers who have a criminal record for any damage to the environment. § Priority to suppliers engaged in the pursuit of sustainability. § Inclusion of the responsibility of the supplier for impacts that stem from by-products at the production and/or post-consumption stages. § Demand for the legal conformity (or superior to legal conformity) of suppliers of goods and services. § Prohibition of child labour and forced labour, stimulating adequate employment relationships and constant verification procedures. § A guarantee of respect to human rights in every aspect of the production cycle. § Differentiated, simplified and favourable treatment for micro and small enterprises. § Inclusion of individuals of groups from the community such as cooperatives of small scale producers, and organisations with revenue-generating projects. 	<p>CF 88 (Arts. 1, 4, 6)</p> <p>Environmental Crimes Law – Law 9.605/1998 (Art. 72 § 8)</p> <p>Micro and Small Business General Law – Supplementary Law 123/2006 and Regulatory Decree 6.204/2007 (Arts. 42 and 49)</p> <p>National Policy on Solid Waste (PNRS) – Law 12.305/2010 and its Regulatory Decree 7.404/2010</p> <p>National Plan for the Eradication of Forced Labour</p> <p>Ethos Indicators</p> <p>Exame Guide</p> <p>ISE – Sustainable Enterprise Index</p>
Energy efficiency and renewable energies	<ul style="list-style-type: none"> § Establishing maximum levels of energy consumption or minimum levels for the energy efficiency of machines and devices, as well as constructions, based on small technical indicators and specific regulations. § Acquisition of climate control equipment or air cooling systems which only use electricity when absolutely necessary. § Automated lighting systems in buildings, elaboration of lighting design, which makes use of green lighting and the use of movement sensors for example. § Exclusive use of long life fluorescent bulbs or tubes and efficient bulbs. § Preference given to the use of solar energy or other clean energy for heating water. § System of individualized measurement of water and energy consumption. 	<p>National Policy for the Conservation and Rational Use of Energy – Law 10.295/2001 and its Regulatory Decree 4.059/2001 Arts. 4 (Policy) 1 (Decree)</p> <p>Decree 7.746/2012 (Art. 4)</p> <p>Normative Instruction 01/2010 (SLTI/MPOG) (Arts. 5 e 6)</p>

Continue>>

MACRO-THEME	REFERENCES FOR SUSTAINABILITY ATTRIBUTES	REGULATION AND SELF-REGULATION
Economy of resources and reduction of environmental impacts	<ul style="list-style-type: none"> § Portfolios have to consider energy efficiency (saving energy), consumption of water and other natural resources, reduction in greenhouse gas emissions and waste production. § Search for cost-effective characteristics for the purchaser of the product of service, taking into consideration direct and indirect costs and benefits of a economical, social or environmental nature, including those related to maintenance, disposal of goods and waste in terms of the economic depreciation index and other factors of equal relevance, known as the 'total cost of ownership'. § Preference for options that lead to a minimisation of impacts on natural resources such as flora, fauna, air, soil and water. § Preference for options with a longer life span with reduced maintenance requirements for the goods or service. § Reduction in the consumptions of energy and water, as well as the use of technology and materials that reduce the environmental impact. § Stimulate the implementations of the life cycle approach to improve the social and environmental performance of the product. § Maximum reduction of the use of dangerous chemical products. 	<p>National Policy on Climate Change – Law 12.187/2009 (Art. 6) Differentiated Regime for Public Procurement (RDC) – Law 12.462/2011 (Art. 4 and 19) Decree 7.746/2012 (Art. 4) Normative Instruction 01/2010 (SLTI/MPOG) (Arts. 5 and 6) National Policy on Solid Waste (PNRS) – Law 12.305/2010 and its Regulatory Decree 7.404/2010 ISO 26000 – Directives on social responsibility</p>
Waste Management	<ul style="list-style-type: none"> § Observation of the product's life cycle in terms of the lack of generation, reduction, reuse, recycling and treatment of waste, as well as the environmentally correct disposal of waste products. <ul style="list-style-type: none"> ✓ Packaging made from reused and/or recycled materials. ✓ Priority given to recycled and recyclable products. § Preference to products that reduce the volume and harmfulness of waste. § Search for guarantees of adequate environmental management of waste in construction. § Integration of reusable and recyclable material collectors in activities that involve shared responsibility for the life cycle of products. 	<p>National Policy on Solid Waste (PNRS) – Law 12.305/2010 and its Regulatory Decree 7.404/2010 Differentiated Regime for Public Procurement (RDC) – Law 12.462/2011 (Art. 4 and 19) Normative Instruction 01/2010 (SLTI/MPOG) (Arts. 5 and 6) ISE – Sustainable Enterprise Index Exame Guide Ethos Indicators</p>
Water Consumption	<ul style="list-style-type: none"> § Requirements/verification in terms of the existence of a system for reusing water. <ul style="list-style-type: none"> ✓ Exploitation of rainwater. Addition to the plumbing system of elements that make collection, transport, storage, and the exploitation of this water possible. § Requirements/verification in terms of the existence of a treatment system for waste generated. 	<p>Normative Instruction 01/2010 (SLTI/MPOG) (Arts. 5 and 6)</p>

Continue>>

MACRO-THEME	REFERENCES FOR SUSTAINABILITY ATTRIBUTES	REGULATION AND SELF-REGULATION
Certifications/Proof of origin	<ul style="list-style-type: none"> § Request of certification to attest the quality of the product or the manufacturing process which includes environmental aspects, with the possibility of demanding certification for official public institutions, and accredited or private institutions. § Mandatory certification or other means of proving the adequacy of suppliers. § Forecasts for due diligence to verify the adequacy in terms of the portfolio. § At the very least, proof of legal and non-predatory origin of timber to be used in the execution of work or services. § Requirements for government stamps, such as Procel for the conservation of electricity. § Priority to suppliers formalised in procurement policies, with social and environmental certification (such as SA8000, ISO 14001, FSC stamp, FLO, ABNT NBR 16001, among others). 	<p>Differentiated Regime for Public Procurement (RDC) – Law 12.462/2011 (Art. 4 and 19)</p> <p>Normative Instruction 01/2010 (SLTI/MPOG) (Arts. 5 and 6)</p> <p>National Policy for the Conservation and Rational Use of Energy – Law 10.295/2001 and its Regulatory Decree 4.059/2001 Arts 4 (policy) and 1 (Decree)</p> <p>Ethos Indicators</p>
Specific commands for sustainable public procurement	<p>Executive authority will provide incentives for activities related to the environment with a view to: the development of research and technological processes, the manufacture of anti-pollution equipment, other initiative that provide for the rational use of environmental resources.</p> <p>Confers to all the right to an ecologically balanced environment and imposes on Public Authority, in all forms of activity and to all ends, and the collective whole, the duty to defend this and preserve it and list the duties of Public Authority, conferring mandatory state intervention on the subject.</p> <p>The Constitution deals with the principles that govern economic activity which are aimed at ensuring: free competition (IV), consumer protection (V), defence of the environment (VI), reductions in regional and social inequalities (VII), the pursuit of full employment (VIII) and differential treatment for small businesses (IX). These principles may be regarded as sufficient for the insertion of sustainability attributes in procurement.</p>	<p>National Policy for the Environment – Law 6.938/1981 (Art. 13)</p> <p>Federal Constitution – (CF/88) (Arts. 225 and 170)</p>

Continue>>

MACRO-THEME	REFERENCES FOR SUSTAINABILITY ATTRIBUTES	REGULATION AND SELF-REGULATION
Specific commands for sustainable public procurement	<p>Principles and objectives for procurement, aimed at guaranteeing the observance of the constitutional principle of isonomy, in the selection of the most advantageous proposal for the administration and the promotion of sustainable national development, and process and judged according to strict conformity to the basic principles of legality, impersonality, morality, equality, publicity, administrative probity, abidance by the bid invitation, objective judgement and any such correlates.</p> <p>Clarifications on:</p> <ul style="list-style-type: none"> • The most favourable proposal: deals with the total effective cost which includes social and environmental impacts (externalities). This perception avoids the State have to spend on costly and uncertain repairs to damage caused during the life cycle of such products and/or services. It is a cost-effective relationship for Public Administration. • Efficiency principle: goes beyond financial efficiency, referring to the efficiency of the procurement decision, which should not generate “extra” costs caused by social and environmental damages for the Administration in the medium and long term. • Allows for a margin of preference for manufactured goods for national services that comply with Brazilian technical norms, taking into consideration the generation of employment and income, the effect on tax collection, development and technological innovation in the country, the additional cost of products and services and the analysis of results (Arts. 3 and 5). • Establishes rules for the content of procurement for the execution of work and provision of services, and at the same time legitimates the demand for exclusive characteristics and specifications – it also makes a preference for certain brands possible – if they are appropriate to the collective and during the process, are well justified (Arts.7 and 5). • Determines that in basic and executive projects for work or services the environmental impact will be considered among the main requirements (Art.12). • Foresees differentiated treatment for national products and exempts the bidding processes for institutions involved in the rehabilitation of prisoners (Art.24, XIII), associations for the physically disabled (Art.24, XX) and collectors of recyclable materials (Art.24. XX-VI) all of which are non-profit. • The Law only prohibits unreasonable, unjustifiable demands that do not correspond to the established objectives. Therefore, if there is a legal basis for reiterating the importance of sustainability attributes, the chances of a legal objection are greatly reduced. 	<p>Federal Constitution – CF/88 (Art. 37)</p> <p>Public Bids and Contracts Law – Law 8.666/1993</p>
	<ul style="list-style-type: none"> • Introduces sustainable procurement as an economic instrument for achieving the purpose of this policy. Among the directives are: stimulation and support of the maintenance and promotion of practices, activities, and technologies with low greenhouse gas emissions and sustainable production and consumption standards, preference in procurement and public tenders for proposals that support the creation of a low carbon economy. • An 80% reduction in the deforestation rates in Amazonia Legal by 2020, on the understanding that public procurement is a strategic tool for containing illegal or predatory deforestation (Art.6 of Decree 7.390). 	<p>National Policy on Climate Change – Law 12.187/2009 (Arts. 5 and 6)</p>
	<ul style="list-style-type: none"> • Priority given in governmental procurements to recycled and recyclable products, and for goods, services, and labour which take into consideration criteria compatible with standards of sustainable social and environmental consumption. • Defines the order of priority for waste management, as being: non-generation, reduction, reuse, recycling, and treatment of waste and its environmentally adequate disposal (Art.7, II). Requirement for reverse logistics that must be regulated following approval by sector agreements (Art. 9). • Provides incentives for the implementation of the life cycle assessment of the product, green labelling, and sustainable consumption while presenting possible tools to assist buyers and suppliers in decision-making in terms of the quality of the products (Art. 7, XII, XV). 	<p>National Policy for Solid Waste (PNRS) 0 Law 12.305/2010 and its Regulatory Decree 7.404/2010</p>

Chapter Highlights

- The focus on production and consumption which is less harmful to the environment, living conditions and human rights has strengthened the connections between procurement and sustainability, and has also done so from a normative point of view.
- Public procurement with social and environmental attributes have legislative support, including Law 8.666/1993 which was altered in 2010 to consider the promotion of sustainable national development and its objectives.
- The procurement or supply manager plays a fundamental role in sustainable procurement processes by taking them beyond price, time frame and quality.
- Consumption encompasses a range of responsibilities shared among citizens, businesses, and public authorities. It is necessary to go beyond the regulatory and control and inspection power of the State.
- The ISO norm on Sustainable Procurement will be an important reference tool for buyers and suppliers.



3

A new look at decision-making

The 'life cycle' perspective in the search for the 'best' price

Coming to have a broad understanding of reality and understanding its diverse connections, evaluating pros and cons, as well as comparing different options for paths to take is an increasingly deep-rooted concern in daily life – both in domestic, business and governmental contexts. When faced with the planet's social and environmental dilemmas, this way of seeing the world can be applied to a key question which frequently arises during the decision-making process: which option is more or less sustainable, and with so many variables to choose from, which goods and services result in fewer

negative impacts? During purchasing or procurement, a broader view of the positive and negative impacts of the many available options helps to evaluate long term cost-effectiveness.

Following decades of debate and advances in science, the world today has a reasonable understanding of the main social and environmental problems and their risks and we already know what these problems are and how to avoid them - although perhaps shared responsibility for them has not yet been assumed. Among the current challenges, and fundamental to expanding on the practical initiatives that respond to these impacts, the understanding of "how much" these impacts will affect the situation as a whole has become increasingly significant. In other words, in the context of consumer decisions: to what extent is a product or service better or worse than others from a social and environmental point of view?

It is no coincidence that the world today bears witness to a race in management and technology to find ways of measuring social and environmental impacts that can generate reliable and globally recognised indicators capable of guiding decisions. Businesses and governments around the world have increasingly lent support to life cycle thinking for different types of decisions, including those related to procurement and purchasing, with the aim of supplying information that will guide more sustainable and responsible management, avoiding the transference of negative environmental impacts from one system to another.

Within this context, a highly useful tool has gained recognition for its ability to provide a more complete, systemic, and comparative vision of production and consumption, and their relationships with the environment: Life Cycle Assessment (LCA), which proposes an assessment of the potential environmental impacts throughout the history of the life cycle of a product (goods or services), from the extraction of raw materials up to its final disposal. The results obtained represent a powerful diagnostic tool to support the procurement policies of organisations, labelling initiatives which help to guide citizens, and the development of new solutions and business activities, including improvements to production processes which make them less harmful to the environment.

LCA Concepts and Context

The concept of LCA is not exactly new. It first appeared in the 1960s when the world was going through the oil crisis, and a number of questions were being asked about pollution.ⁱ As such, the first LCA studies focussed on energy use. Soon afterwards, Coca-Cola funded a pioneering study carried out by the Midwest Research Institute (MRI) aimed at comparing different types of packaging for soft drinks. To the surprise of many, at the time, the non-returnable plastic bottle was identified as the least harmful alternative in terms of impacts on the environment, when all stages of the life cycle were taken into consideration. This result was explained by the fact that the material was lighter in relation to the others, which meant less emission of gases during transportation.ⁱⁱ

In the following decade, EPA, a North American environmental protection agency, improved the method and it was soon introduced into the chemical industry. In the 1980s, the European Economic Community advised businesses on monitoring their energy consumption and use of natural resources, based on this new tool. During the same period, Swiss institute EMPA (Swiss Federal Laboratories for Testing and Research) developed a tool for measurement with standards of reference for the analysis of the environmental impact of packaging. The first public database was created with data on various materials that would assist in applying the method.ⁱⁱⁱ

There was an explosion of comparative studies. However, owing to an intensely competitive atmosphere, the LCA ended up being exploited as part of a marketing war in which only results relevant to particular types of packaging were shared. Undermined by this problem, the method lost force in the corporate world and the need for standardisation became evident. In Europe, a movement grew in support of a global standard for environmental management practices, which led to the creation of the ISO 14000 series of norms. Among other factors, the process of adjustment came to encompass assessment tools for products and services in terms of their environmental impact, including the LCA – a process which involved more than 300 researchers from 29 countries.^{iv}

As a support to the introduction of sustainability attributes into production and consumption, the life cycle based method was mentioned in international documents such as the Earth Summit and the Johannesburg Declaration and Plan of Implementation, both of which were signed by Brazil. Nationally, the LCA has legal basis at the federal level in Law 12.305/2010 which deals with the National Policy on Solid Waste, as well as in norms that specifically focus on sustainable public procurement (*see chapter 2*).

In Brazil the “tropicalisation” of the model has also been discussed and a platform has been created with details in line with the national reality in terms of water consumption, sources of energy and other factors of significance in the analysis. Coordinated by the Brazilian Institute of Information in Science and Technology (IBICT), the Brazilian LCA Programme, approved by the CONMETRO Resolution no. 4/2010, has progressed more slowly than hoped due to problems with financial resources.

The realisation of an LCA study begins with the definition of objectives and scope, followed by data collection in order to establish all of the interaction the product will have with the environment throughout its life cycle. The adoption of a “cradle to grave” conception means that all interaction, from the extraction of raw materials up to final disposal, must be considered. Following this, an evaluation is undertaken of the environmental impact potentially associated with anthropogenic activities, according to the categories of environmental impact defined at the beginning of the study. The *Global Guidance Principles for Life Cycle Assessment Databases* produced by UNEP (United Nations Environment Programme)^v proposes an assessment of the impacts in terms of eleven categories, which are:

Companies unite themselves in order to incorporate the Life Cycle Assessment as a tool to measure impacts and develop new products

- Acidification
- Consumption of natural resources
- Depletion of the ozone layer
- Ecotoxicity
- Eutrophication
- Photochemical ozone formation
- Climate change
- Loss of biodiversity
- Human toxicity
- Water use
- Land use

An LCA study can offer a vast range of information about a given product, but may still come up against limitations including a lack of significant data

Databases technology has evolved which ensures more data security. In Brazil, the challenge is to create a system which is adapted to the national context

and the need for a prolonged investment of time, specialised professionals, and financial resources. During execution it is important that there is regional data on the production of supplies and the technology adopted, information which is not always available – Brazil for example does not yet have a database that aggregates the national reality as it is found in Europe and the USA.

The LCA tool should not be employed as a single subsidy to purchasing and procurement decisions, since naturally there are limits to its scope and it cannot encompass all the realities that the product will experience – this because LCA studies tend to define a series of premises which are only valid within a determined scenario and which cannot be extrapolated

without necessary adaptations. In addition to this, neither social, nor financial impacts are considered.

The articulation among key players and support from the private sector and government should favour the development of studies and the dissemination of the concept of life cycle, providing incentives for sustainable practices.

Step-by-step for the elaboration of studies

Without losing sight of the life cycle’s systemic perspective, it is possible to define a focus for an LCA study in a category of environmental impact. In the context of the “Sustainable Procurement & Major Events” initiative the elaboration and discussion of the results of the studies were carried out based on the **climate change** category, which seeks to quantify all greenhouse gas emissions associated with a product’s life cycle and is calculated by using the carbon footprint.

The decision to use this framework can be justified by the broad dissemination and global use of the carbon footprint measurement, (which allows for analytical comparisons), and also by its compliance with the recent National Policies on Climate Change and Solid Waste, along with the general objective of the Action Plan for Sustainable Production and Consumption (PPCS), which together aim to tackle climate change through production and consumption.

At the invitation of the Thematic Chamber for the Environment and Sustainability in the World Cup (CTMAS), in 2012, the United Nations Environment Programme (UNEP) collaborated in efforts to implement the sustainability agenda within the agenda for the 2014 World Cup with two projects: the Green Passport campaign for changes in the behaviour of tourists and sustainable practices in the tourism sector, and the “Sustainable Procurement & Major Events” initiative.

As a result of a partnership between the Ministry for the Environment, UNEP and the Centre for Studies in Sustainability at FGV (FGVces – EAESP),

the objective of the initiative was to disseminate and support, together with public and private agents, the importance of considering the life cycle of products (good and services) at the time of procurement in the context of major events, expanding this strategic vision to also include everyday procurement, with a view to potentially integrating sustainability attributes into decision-making processes.

For this to occur, in addition to the articulation of key players, research was conducted to assess the environmental impact of conventional products and the identification of alternative products with a better environmental performance. Finally, guidelines were developed for procurement with sustainability attributes for seven carbon footprint studies.

The carbon footprint studies, which assessed the environmental impacts related to the category of climate change, were aimed at providing a systemic perspective by means of a quantitative method to guide procurement decisions and contribute to a technical legacy for advances in LCA in Brazil. Nonetheless, the study's intrinsic limitations are acknowledged and include: the restriction of the method's application to only include the category of climate change, the characteristic of the studies of being a simplified approximation based on secondary data, and, as has already been noted, the fact that social and economic aspects of these life cycles are not taken into account.

DEFINING THE SCOPE

I. Defining the scenario

The first step in the development of these studies was the delimitation of a scenario in which the products are to be selected for the application of the carbon footprint method.

In the context of this initiative, which falls within the framework of major events, the chosen scenario was the 2014 World Cup, due to the proximity of the event which opened up a space for the possibility of identifying the actual need for procurement which might be called for, and also allowed for details to be obtained on the quantity of participants, the volume of procurement, the technical specifications of acquisitions, and the use that would be attributed to the existence of potential suppliers who could respond to these great demands. On the other hand, this choice also brought with it a recognition that the technical results of studies of products to be used in an event that was about to take place, would not happen in sufficient time to influence major buyers with a view to directing them towards more sustainable effective acquisitions. As such, it was acknowledged that for other future events and indeed everyday procurement, these results could be appropriately adapted and incorporated.

II. Defining the products

It was the responsibility of partner institutions to establish the premises for the selection of items to be analysed, and in addition to the relevance of the social environmental impact of the life cycle they would also take into consideration:

- The existence of a (preferentially high) demand for the product or service during the World Cup.

- Potential for replication: the product must also be an example of an everyday procurement in the public and private sectors and, if possible, purchases made by citizens.
- Must comply with institutional mandates: the product has to be relevant to the objective of compliance with the National Policy on Solid Waste, National Policy on Climate Change and PPCS.
- Awareness and communication: the product has to be capable of transmitting a message about sustainable consumption to the general public.
- National origin: preference for products that use national raw materials and which are manufactured in Brazil.

The cities and states that hosted the World Cup, along with the Federal Government and sponsors, were contacted with the aim of assessing the real need for acquisitions, even though the time frame of the studies was incompatible with the period of time required for procurement.

The result of this consultation was the construction of a matrix that listed the selected items according to their given requirements – a cotton t-shirt, paper leaflet, plastic bag, MDF table, disinfectant, a typical Brazilian meal, and a football match – in relation to the premises, so that their compliance could be verified, even at different levels.

For instance, the cotton t-shirt was chosen due to the procurement need for thousands of t-shirts for World Cup volunteers and, at the same time, it was confirmed to be an item for which there was a great demand in public administration (E.g. school uniforms), allowing for the promotion of a more sustainable production cycle. The leaflets and carrier plastic bags have a high potential for communicating with the citizen, in addition to their recurrence in institutional procurement. The furniture, destined for the event's press rooms, and the disinfectant, used in public and private buildings and in the day-to-day of individuals, were required in large volumes in temporary structures and hotel


chains, and may represent important negative environmental impacts, mainly in their disposal. The typical Brazilian meal, one of the greatest demands for the event and relevant to climate change and solid waste agendas, despite being very familiar to the individual consumer, requires the availability of information in order to meet its potential in terms of raising awareness. The football match, which represents the essential preparations for a major event such as the World Cup, although not commonly contracted by institutions, nonetheless involves recurring private and public acquisitions such as air travel, catering and energy, and presents results relevant to the decision-making process.

With the choices made, the application of the method to each item could begin. An introductory text outlining the product sector highlighted details of the production, commercialisation and the most relevant environmental and social impacts.

2 CARBON FOOTPRINT CALCULATION

In each study, which was characterised by the “cradle to grave” perspective, the environmental and social impacts were analysed starting with the acquisition of materials and pre-processing, leading up to the end-of-life. Based on international databases and studies on the theme the method used was the *Greenhouse Gas Protocol: Product Life Cycle Accounting and Reporting Standard** (GHG Product Protocol)^{vi}. The calculation of carbon footprints was done using Umberto NXT CO₂ software, a tool which makes it possible to measure greenhouse gas emissions based on the modelling of a production process and its flow of materials and energy.

* The GHG Product Protocol is a method that assists in the elaboration of carbon footprint studies of products, taking into consideration the emission and removal of greenhouse gases (GHG) throughout the life cycle of a product and is based on the directives: ISO 14040:2006, *Life Cycle Assessment: Principles and Framework*; ISO 14044:2006, *Life Cycle Assessment: Requirements and Guidelines*; Publicly Available Specification (PAS) 2050, *Specification for the assessment of the life cycle greenhouse gas emissions of goods and services*.



The definition of three fundamental elements marks the beginning of a life cycle study: function, functional unity and reference flow.


The function is what governs all of a product's life cycle as it has considerable influence over consumption (use stage). To define this, the actual reason for creating that particular product is considered, along with its purpose and its characteristics.

Functional unity brings together performance characteristics and services supplied by the product, such as: the time taken to attain the function and the expected quality. Meanwhile, the reference flow is the quantity of products required in order to serve the defined function and studies of this will put these results into perspective.

The beginning of the life cycle modelling of the product starts with the creation of a process map in which the stages of the product's life cycle are organised to define the range of the study's parameters, which includes all the attributable processes, or, in other words, establishes the relevant services, materials and expenditure of energy that delimit the manufacture and the existence of the product and will therefore take into consideration its GHG emissions.

The life cycle was divided into five stages: **acquisition of materials and pre-processing** (from the extraction of raw materials to the arrival at the production plant), **production** (from the arrival at the production plant to the exit, as a final product), **distribution and storage** (from the moment it leaves the factory to its acquisition by the consumer), **use** (from the acquisition by the consumer to the final disposal or waste treatment) and **end-of-life** (from the disposal to its return to nature – decomposition, incineration, recycling).

Data collection, which follows the definition of parameters and the creation of the process map, is a highly important stage, which has a significant impact on the quality of the study. It may also be the longest and most difficult stage due to the difficulty, complexity and scarcity of available data. The result of



this phase is the quantification of material that enters and exits the system. The studies of this initiative used secondary data, obtained from databases, market averages, known processes, and other studies.

Having established the data and the process map, computational modelling can begin, and in this case was done using Umberto NXT CO₂ software, which considers all the GHG emissions and removals in CO₂ equivalent. The carbon footprint (CO₂ equivalent - CO₂eq) is related as a total figure and also as a proportion relative to each stage of the life cycle, where the activities that most contribute to the product's total emissions are identified and which, therefore, must be the focus of attention for potential improvements.

During the development of the process map and data collection some premises should be adopted to create a foundation-scenario. An awareness analysis can be carried out to assist in understanding how much each premise influences the final result. Alterations are made to some initial premises and the impact of these alterations on the final result is observed. This is not an obligatory procedure and it varies according to the understanding that the choices made throughout the study, may have significant influence on the life cycle.

Having completed the main development phases of a carbon footprint study, and faced with a modelled life cycle, it is possible to have a systemic comprehension of the impacts on climate change at each stage, and this brings the quantitative approach to an end. With this assessment in hand and observing the stages that represent the greatest negative impacts, bibliographical references were researched on alternatives to the conventional products studies and, with the aim of generating a broader discussion on the other categories of environmental impact relevant to that product, LCA studies, when available, were also considered, which contributed to building a more complete picture with a vision beyond the climate change category.

Finally, based on all of the information obtained with the results of the carbon footprint, alternative products are suggested and other categories of environmental impact are discussed – and whenever possible, the social impact too – leading to the recommendation of a product with the lowest negative impact for the scenario presented in this initiative. In parallel with this, brief research was carried out with the Brazilian supply market to assess the capacity to and interest in meeting these possible demands with sustainability attributes.

A point worth noting is that, despite it not having been studied in great depth in this initiative, it is understood that the vision of the supply market cannot be reduced to the lowest price. It is necessary to carry out a cost analysis that integrates the idea of supply chain externalities. Another factor is that the market is constantly changing. As such, market research has to be updated at a time close to the acquisition.

3 INSERTION OF SUSTAINABILITY ATTRIBUTES IN PROCUREMENT

With the technical base described, and national and international references from other governments and institutions combined, it was possible to develop attributes and guidelines for more sustainable procurement.

Among the guidelines, it is worth remembering that the planning phase of the procurement is fundamental. Prior to the acquisition, the priority should be a potential reduction in the quantity and/or a reconsideration of the real need for the product, always tied to an increased efficiency in the use of items that have already been acquired. For this to happen, certain steps can be taken, such as: product repairs, stock checks, forms of conservation and maintenance, and options considered for the procurement and/or hire of a service, for example^{vii}. Should the need be confirmed, the recommendation is an assessment of

the social and environmental impacts and opportunities associated with the purchase. At the same time, a broad knowledge of the market is also fundamental, given that there are varying opinions on types of material and the prices of more sustainable products. (See *“Step-by-step guide to sustainable institutional procurement” Chapter 2, pages 42 and 45*).

There is a point of focus that arises in the consideration of sustainable procurement, which is the balance and, at the same time, the tension between environmental and social attributes in the same product. It may be that according to the LCA the product is perfectly adequate in environmental terms, but in a social context it has been produced without considering the best social practices. In this situation, how should the buyer behave? Is it possible that this great push to seek products with excellent environmental efficiency might in fact end up distancing us from considering the social criteria of sustainability? These questions persist without clear specific guidelines, which in some cases may come from norms that deal with sustainable procurement, or from court jurisprudence. One possible route is that obligatory requirements, which have already been defined by legislation, are clarified (legality of operation, documentation of labour, etc.), since they themselves will exclude suppliers who don't comply with them.

In the absence of a tool to measure environmental impacts, the evaluation can be carried out by means of a simple assessment of the risks inherent to the 5 stages in the life cycle of the conventional product, with qualitative research and contact with experts.

Taking the opportunity for sustainable procurement in major events as their main theme, pages 84 to 113 of this book present specific carbon footprint studies for a football match and six products commonly consumed in sports competitions and large-scale music concerts: plastic bag, a meal, paper leaflet, cleaning product (disinfectant), MDF (table) and a cotton t-shirt.

A tool for procurement decisions

The following pages bring together studies on the life cycle approach for products required at major events, with a focus on the carbon footprint. See below some important considerations about the method

The understanding that a decision may result in negative social and environmental impacts is the first step to assess the need for procurement and to integrate sustainability attributes into this process. To make this happen, a systemic approach to the product through life cycle thinking may contribute to assess these potential impacts and help to answer questions such as: which impacts or externalities must be prioritised to mitigate or reduce? Which characteristics, and to what extent, define a more sustainable product: recyclability, durability, toxicity, or the energy source used? The decision must be made in favour of the product that displays the best environmental performance throughout its life cycle, with function, quality, and level of satisfaction being equal, or better, in comparison with a conventional product. In short: it should have the best price and not only the lowest price.

In order to support this decision, it is possible to take advantage of the life cycle assessment (LCA), a technique which seeks to identify and understand human activities in the life cycle of a product (goods or services) and analyse all the potential related environmental impacts. An excerpt of this assessment, which considers all environmental impacts categories in its original and complete form, proposes to consider the emission and removal of greenhouse gases, measured by using the carbon footprint. The activities at different stages of the life cycle were considered – acquisition of materials and pre-processing, production, distribution and storage, use, end-of-life.

The method was applied to six products – t-shirt, leaflet, plastic bag, disinfectant, a typical Brazilian meal – and, in the case of the football match, the method was adapted to an event. The results were enhanced by a qualitative discussion on other categories of environmental impact associated with the life cycle, in addition to the category of climate change, in order to provide more systemic support to the guidelines for acquisition.

Method employed: *Greenhouse Gas Protocol: Product Life Cycle Accounting and Reporting Standard (GHG Protocol para Produtos)*, which is based on directives ISO 14040:2006, *Life Cycle Assessment: Principles and Framework*; ISO 14044:2006, *Life Cycle Assessment: Requirements and Guidelines*; *Publicly Available Specification PAS 2050*.

Software for modelling and calculations: *Umberto NXT CO₂*.

The step by step process for decision-making based on the environmental impacts of a product's life cycle, adopted in this initiative, can easily be replicated for other institutions and contexts of procurement, beyond the scenario of major events.

STEP BY STEP GUIDE TO DEVELOP THE STUDY

1

DEFINING SCOPE

I. Defining the scenario

Search for a definition and understanding of the context in which the procurement will take place – who are the buyers and interested parties, what have they acquired and/or do they intend to acquire.

II. Defining the products to be studied

Emblematic products are highly relevant in terms of the associated social and environmental impacts in their supply chain, as well as a combination of budgeting, volume acquired, and viability, in addition to their potential to for replication and raising awareness.

2

CARRYING OUT A CARBON FOOTPRINT STUDY (GHG Product Protocol Method)

III. Establishing objectives and scope of carbon footprint study

IV. Characterising the product

V. Defining the parameters and process map

VI. Data collection and analysis

VII. Data Allocation

VIII. Calculating results

IX. Report of results in CO₂eq

X. Recommendations based on qualitative assessment of other categories of environmental impact

3

INSERTION OF SUSTAINABILITY ATTRIBUTES IN PROCUREMENT

XI. Analytical discussion on the products with the best environmental performance

The carbon footprint identifies the stages in the product's life cycle that contribute to the highest greenhouse gas emissions. Based on this, an alternative product is suggested to the one being analysed and which, through the use of other studies, displays a better environmental performance in terms of climate change. At this stage other social and environmental impacts are also considered. The alternative product must reduce greenhouse gases without impacting on other environmental or even social categories.

a. Assessment of potential suppliers to meet the demands of sustainability attributes.

b. Research of national and international references to create guidelines and attributes for procurement.

Reflections and limitations

- An LCA study with a specific focus, such as the climate change category, results in a limited assessment. To better assist the decision-making process, we suggest that national LCA studies should be conducted and published, in other words, studies that consider all environmental impacts, in addition to a watchful eye on social impacts.
- The scope of this initiative did not take into account the elaboration of comparative studies of conventional and alternative products. The comparisons made were based on studies available in the literature.
- The LCA is not always the best choice for a procurement decision. What is fundamental is that a systemic approach is applied to the procurement decision and there is greater clarity on the externalities involved in the life cycle.
- The LCA tool will not provide concrete answers to economic, legal, and social questions related to the life cycle of products and sustainable consumption. The results of a study offer information – not solutions to environmental problems, it is an environmental diagnosis of the product and a potential tool for its management.

- It is necessary to persist, with the emphasis on establishing a reliable regional database to assist LCA studies with a view to bringing technical studies closer to the reality in Brazil, avoiding as such, modelling based on international data.

Cotton t-shirt

This illustration presents the results of a carbon footprint study for a 100 % cotton, medium-sized t-shirt, made of 150g of cotton, which serves as both clothing and identification. Emissions from processes related to dyeing, printing and packaging were not considered.



ACQUISITIONS OF MATERIALS AND PRE-PROCESSING

In the agricultural phase, weaving and sewing, are the processes that represent the greatest contribution to GHG emissions. Transportation of the fibres to processing may be considered insignificant throughout the life cycle.



PRODUCTION

Considering there are no direct emissions and only consumption of electricity the production's contribution is negligible largely because the Brazilian electricity grid has a low level of emissions factor.



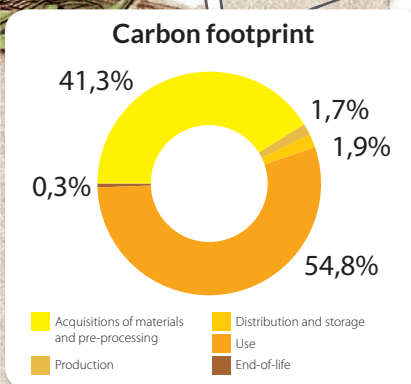
DISTRIBUTION AND STORAGE

The impact is caused by the use of fossil fuels, mainly diesel, in national transport. However, this stage reveals itself as irrelevant in comparison to other stages in the t-shirt's life cycle.



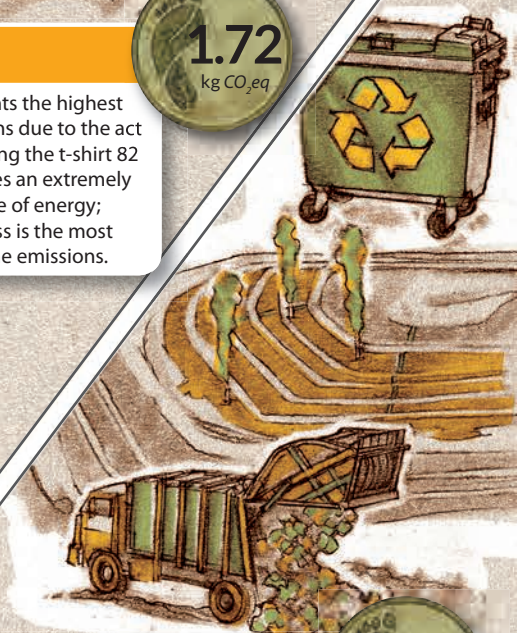
USE

This stage represents the highest level of GHG emissions due to the act of washing and ironing the t-shirt 82 times, which involves an extremely high expenditure of energy; the ironing process is the most responsible for the emissions.



Suggestions for the tender

- Create a single contract involving supply and maintenance of parts of the clothing.
- Guarantee adequate collection and post-use disposal.
- Require information on the t-shirt's label aiming at increasing its durability and reducing impacts
- Show the exact proportions of materials in the case of products that use a variety of textiles.



END-OF-LIFE

The impact of transportation of the material is superficial in the context of other emissions during the life cycle. All the carbon returned to the environment at this stage comes from absorption in the agricultural stage.

Information from the study¹



Study data and parameters

Secondary data from the *ecoinvent*² database was used to measure the environmental impact in the climate change category for the life cycle of a t-shirt.

To calculate the emission from the agricultural production of cotton, was considered the *ecoinvent*'s fixed value (in CO₂/kg cotton fibre).

The transportation of the cotton to the textile factory took into consideration the distance between Mato Grosso and the municipality of Americana (São Paulo State). The electricity consumption of the sewing and weaving machines was multiplied by the emissions from the Brazilian electricity grid.

During production the cutting and sewing machines also consumed electricity.

Departing from the Municipality of Americana, the t-shirts were distributed to the twelve host cities by road transport networks.

Over a period of three years, each t-shirt was worn 82 times and always washed in an electric machine with cold water and washing powder, dried in open air (washing line) and ironed with an electric iron for two minutes.

Despite the possibilities for reuse, the disposal was in a landfill site with capture and burn of methane.

Results and discussion

During the acquisition of materials and pre-processing stage, the most responsible stages for the carbon footprint were the agricultural production and the weaving and sewing, in that order. The use, which produced the highest GHG emission, has high energy consumption, mainly due to the electric iron; the emissions from washing come from the consumption of electricity, water and washing powder. One route to reducing the emissions in these stages is to apply good agricultural practices and reduce the need for the electric iron through raising consumer awareness and/or looking for technological fabrics that reduce the need for ironing.

The alteration of some initial premises showed that the ironing time and the method of drying the t-shirt are relevant to the result: ironing for 1 minute (the value used in the study is 2 minutes) reduces the footprint by 18%, making the initial stage the main sources of emissions. The use of an electric dryer, instead of drying on a clothesline, would raise the life cycle emissions by 62%.

¹ Full details are available in the technical report with bibliographical references at: www.fgv.br/ces

² The *ecoinvent* database is not free and must be accessed using software with an integrated database; in this case Umberto software was used.

Alternatives to the 100% cotton t-shirt were assessed which took into account the qualitative analysis of other environmental impacts, in addition to those related to climate change. For example, organic cotton t-shirts may also be beneficial in terms of the categories of loss of biodiversity, ecotoxicity, and human toxicity. Studies have shown that compared to conventional cotton, organic cotton has a superior environmental performance. From a social perspective, it generates benefits related to the health of workers and users of the product, as well as favouring compliance with labour and human rights.

A t-shirt made from fibre produced from recycled PET bottles presents two main advantages from an environmental point of view: a reduction in the environmental impact at the stages of acquisition of materials and efficient waste management, by reintroducing post-consumption material into the textile production chain. Studies point to a better environmental performance of a 50% cotton and 50% polyester fabric as opposed to a conventional cotton fabric, in terms of the greater durability of mixed fabric which increases the product life and reduces the environmental impact each time it is used.

Guidelines for purchasing textiles

- Review the need for purchasing and look for reductions in quantity, improvements to conservation, and carrying out repairs.
- Observe the occurrence of significant environmental impacts related to the contamination of water, air and soil.
- Prioritise social issues related to human and labour rights, particularly in terms of forced and child labour, contractual regulations, health and safety.
- Verify norms and legislation on the use and treatment of water (cotton production and manufacturing processes) and the use of chemical components (pesticides, paints, solvents and products for treating fibres).
- Provide incentives for waste reduction and management: give priority to recyclable and recycled packaging, guarantee appropriate collection and disposal of clothing after use, supply information on the label about disposal and maintenance to increase durability as well as the impact stemming from ironing the product.
- Prioritise national and regional products with a view to avoiding major air and road transportation.
- Display the proportions of mixed fibres (E.g. 50% recycled PET and 50% organic cotton).
- If possible, develop a single contract involving supply and maintenance.

Paper leaflet

This item is commonly used in event promotion. As a consequence of energy use, the stage that calls for most attention is the one which encompasses the production of cellulose from eucalyptus plantations and the processing for the manufacture of paper.



9.43g CO₂eq

ACQUISITIONS OF MATERIALS AND PRE-PROCESSING

The production of paper corresponds to the majority of the carbon footprint due to the large amounts of energy in the production of cellulose pulp and its transformation into paper. The dye contributes less in mass proportions than paper.



0.5g CO₂eq

PRODUCTION

Considering that there are no direct emissions, only the consumption of electricity, the contribution here is superficial, mainly because the Brazilian electricity grid has a low level of emissions factor.



3.19g CO₂eq

DISTRIBUTION AND STORAGE

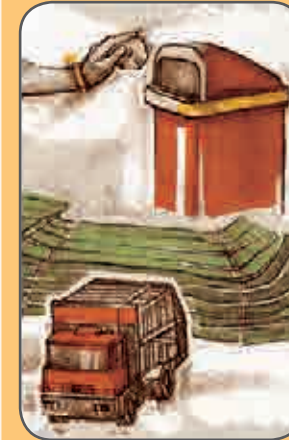
All of the impact here results from the use of fossil fuels, mainly diesel, in national road transport of distribution to host cities.



0.0g CO₂eq

USE

Reading of the leaflet does not represent an impact on the climate change category, given that there are no greenhouse gas emissions at this stage.



0.6g CO₂eq

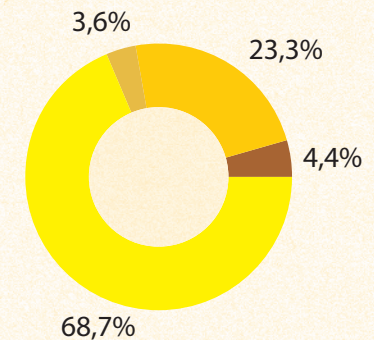
END-OF-LIFE

The impact of the transportation of the material to the landfill site is negligible in terms of the life cycle emissions. All of the carbon returned to the environment at this stage comes from absorption at the agricultural stage.

Paper leaflet glossy white, A4 size, weight in grams 130g/m² for offset printing, front and back
Function: transmit information about tourism and location to those who attend the 2014 World Cup stadiums and/or their surroundings.
Reference Flow: 1 leaflet
Processes not considered: graphic design of the leaflet, the packaging of the printing dye (from the factory to the printer) and the printed leaflets (from the printer to distribution)



Carbon footprint



Discussion

- The production of paper is the stage with the greatest social and environmental impact related to the predominance of mechanised systems, the expansion of planted forests, the high levels of energy consumption and the bleaching of cellulose pulp.
- The dye production, depending on the chemical composition, has significant impacts in terms of generating waste and toxicity.
- The decentralisation of printing services, distributed among 12 cities, is a way to reduce GHG emissions by 20% and potentially benefit local economies in other host cities.

Recommendations and conclusions

- Printing front and back, guarantee infrastructure for adequate disposal and formal procurement of cooperatives.
- Consultation of labels such as FSC, CERFLOR.
- Verify the use of chemicals: it should at least be free of elemental Chlorine or completely free of Chlorine.
- Display the proportions of types of paper: should be at least 75% recycled (pre and post-consumption off-cuts) and 25% virgin paper.
- Obtain information about the origin of the recycled post-consumption constituent.

Information from the study¹



Study data and parameters

In order to measure the environmental impact in the climate change category for the life cycle of a leaflet, secondary data and the *ecoinvent*² database were used.

During the acquisition of materials and the pre-processing stage, fixed values were adopted taken from a Brazilian paper company and an *ecoinvent* value was used for the dye (in kg CO₂eq). These supplies were transported via highways, at distances of 80km and 60km respectively.

In the production of the front and back printing of the leaflet the electricity consumed by the offset printing machines was considered – multiplied by the emissions from the Brazilian electricity grid – as was the use of dye, water and natural gas for drying.

On leaving the Municipality of Sao Paulo the leaflets were distributed among the twelve cities hosting the 2014 World Cup by road transportation.

After the single use, it were considered road transportation and disposal on landfill site.

Results and discussion

The stage of acquisition of materials is responsible for the highest volume of GHG emissions due to the amount of energy used during the production of cellulose pulp and its transformation into paper. The production of dye also has relevant impacts in terms of generating waste and toxicity, which can be minimised by using solid dyes and altering the chemical composition (water-based, plant-based raw-materials).

Largely due to the burning of fossil fuel during road transportation, distribution is the second highest source of emissions and these negative environmental impacts may be reduced by decentralising the location of printing.

The alteration of some initial premises shows that varying the weight of the paper and decentralising the printing process are relevant to the result: a reduction from 130 to 115g/m² would reduce the footprint by 15%; reducing distances for distribution would lead to a 23% reduction.

Options for alternative products were assessed for the white paper leaflet, taking into consideration the quantitative analysis of other environmental impacts, in addition to those

related to the category of climate change. For instance, white paper made from certified timber is beneficial in terms of the categories of loss of biodiversity and the consumption of natural resources. However, certification does not guarantee conformity at all production stages. Attention must be paid to the emission of effluents, which depend on the raw material, manufacturing technology and the chemical products for the treatment of wood and bleaching processes.

Reviews of comparative LCA studies suggest that recycled paper has a better environmental performance than conventional paper in a range of categories, in particular: climate change, acidification, eutrophication, depletion of the ozone layer, toxicity and energy consumption. Evidence implies that the manufacture of recycled paper uses less energy, water, chemicals and reduces the volume of material in landfills. A further advantage is that the potential for recycling boost growth of employment and income in the market based on the socio-productive inclusion of collectors of recycled materials.

The impacts of paper production can be minimised with the creation of digital leaflets that depend on the public's acceptance and the availability of compatible technology.

Guidelines for purchasing paper

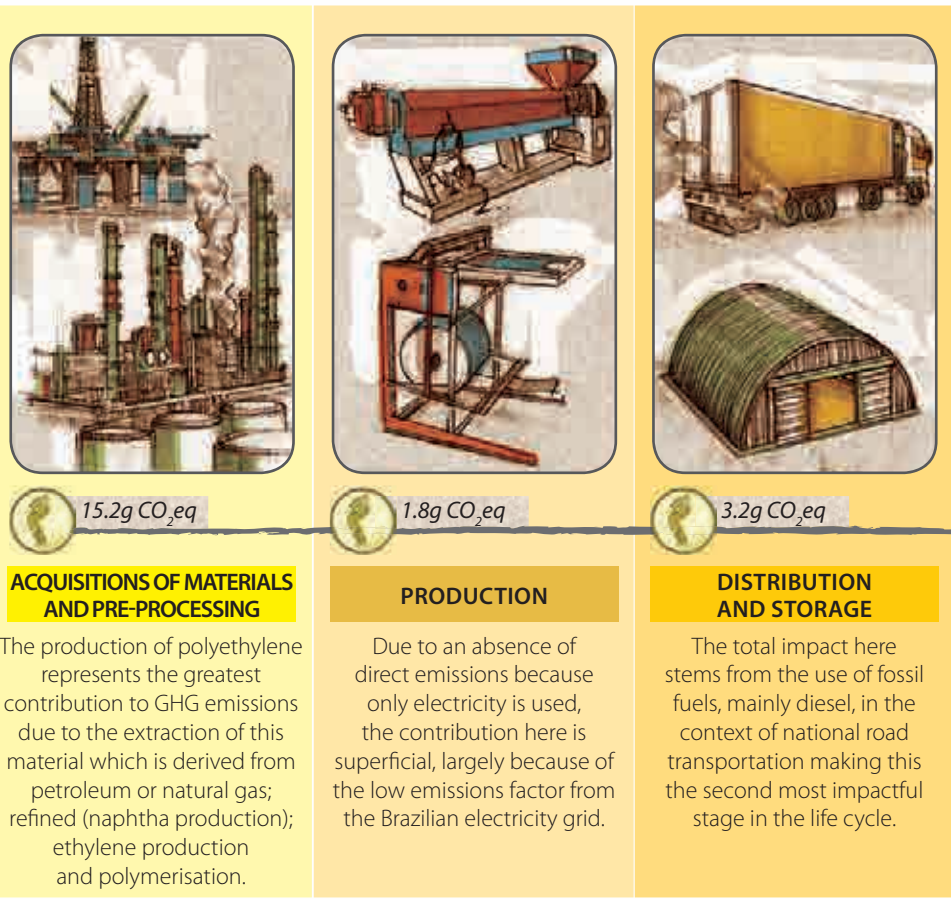
- When purchasing paper for the office, consider the need and look to reduce quantity. At the use stage: encourage the use of email and digital archiving; control printing volume: use both sides of the paper; install infrastructure for adequate waste disposal and procurement of cooperatives.
- Observe the occurrence of toxicity through the use of bleach or other dangerous chemicals and the intensive use of energy in industry.
- Verify norms and legislation on the use of elemental Chlorine – the process should at least be Elemental Chlorine Free or Totally Chlorine Free.
- Use fuel from renewable sources and with a low level of GHG emissions for transportation.
- Display the proportions of materials in types of paper: a minimum of 75% recycled paper (waste from pre and post-consumption) and 25% virgin; considered as ideal: 50% from wood fibre extracted from sustainably managed forestry and 50% from recycled fibre (post-consumption).
- Guarantee that the post-consumption element comes from recycling, with the inclusion of recycling cooperatives.

¹ Full details are available in the technical report with bibliographical references at: www.fgv.br/ces

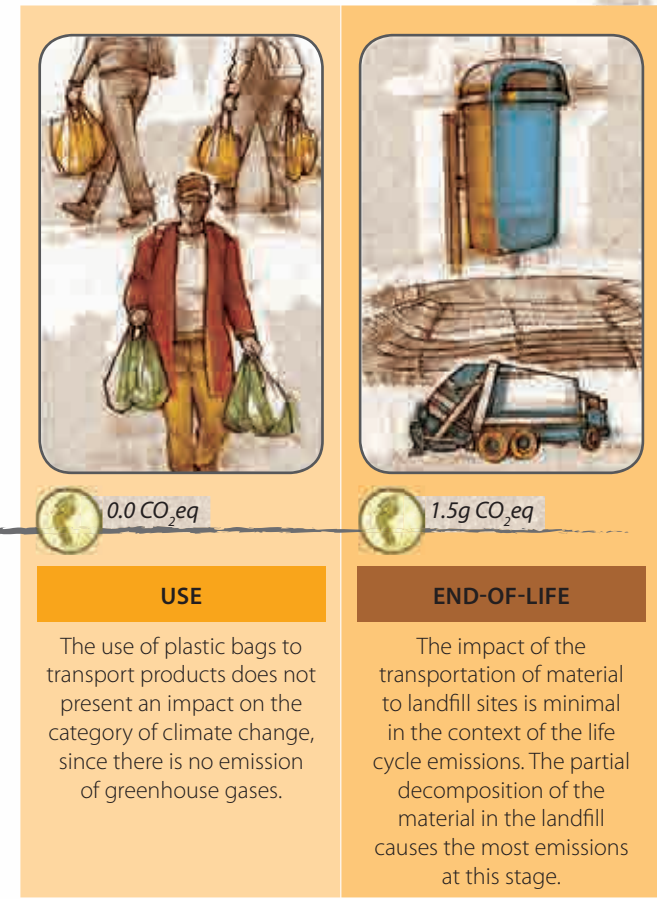
² The *ecoinvent* database is not free and must be accessed using software with an integrated database; in this case Umberto software was used.

Plastic bag

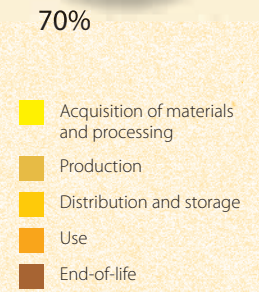
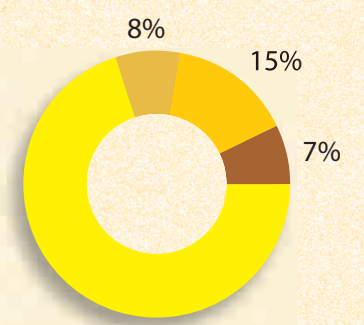
This product is used to transport purchases and its main impact in terms of emissions comes from the extraction and processing of non-renewable raw material, originating in petroleum, and not in the landfill disposal after use.



Plastic bag disposable High-Density Polyethylene (HDPE), t-shirt style, 8.17g, capacity for 19.1l or 6kg.
Function: Transportation, on a single occasion, products acquired at kiosks during the 2014 World Cup.
Reference Flow: 1 bag
Processes not considered: dying, printing, emissions of gases associated with the movement of people involved in the process, packaging for the bags.



Carbon footprint



Discussion

- Increases in consumption generate pressure on finite natural resources and lead to rises in GHG emissions due to extraction.
- The higher the disposability of the bag, the greater the impact on the disposal stage, due to the volume of waste.
- The reduction of impacts at the end-of-life stage is more closely related to controls in consumption and in the adequate disposal than in accelerating its decomposition.

Recommendations and conclusions

- Consider environmental impacts of raw material extraction and the end-of-life in terms of GHG emissions, biodiversity and soil use connected to the volume disposed of and the inadequate means of doing so.
- Use material with greater durability – in the case of plastic, the idea is that it would be recycled, ideally 100% post-consumption.
- Give preference to the acquisition of reusable bags for transporting products, reducing consumption and the volume disposed of.

This example presents a carbon footprint study based on the concept of life cycle thinking, but is not a complete life cycle assessment. Method: GHG Product Protocol; Software: Umberto NXT CO₂; Ecoinvent Database and wherever possible or necessary, national or international data.

Information from the study¹



Study data and parameters

In order to measure the environmental impact in the category of climate change for the life cycle of a t-shirt style plastic bag, secondary data from the literature and the *ecoinvent*² database were used.

In the acquisition of materials and post-processing stage, the emissions figures for the manufacture of HDPE (polyethylene) and lime (CaCO₃) were obtained from *ecoinvent* (in kg CO₂eq/kg). These supplies were transported in trucks for production in the Municipality of Sao Paulo over distances of 215km and 25km respectively.

During production, the polymer extrusion process, in which HDPE and lime are fused, represents a high consumption of energy, in a proportion of 9 (extrusion) to 1 (cutting and welding).

On leaving the Municipality of Sao Paulo, the bags were distributed to the twelve cities hosting the 2014 World Cup, via road transportation.

Following use, without emissions, the road transportation and disposal in landfill with capture and incineration of methanol was considered.

Results and discussion

The greatest emission of GHG occurs in the initial stage of the life cycle and is directly related to the production of HDPE, which is extracted from petroleum or natural gas and which has a significant impact on the environment and the consumption of natural resources given that they are non-renewable.

Transportation by road results in the burning of fossil fuels and this makes distribution the second highest source of emissions.

The results of the carbon footprint do not demonstrate relevance for the use, however, it is worth noting that the conception of the product and the definition of its function guide the nature of consumption and the disposal of the plastic bag, which in turn influence the occurrence of social and environmental impacts – the greater the disposability and/or degree of obsolescence, the greater the chance of more intense impacts.

¹ Full details are available in the technical report with bibliographical references at: www.fgv.br/ces

² The *ecoinvent* database is not free and must be accessed using software with an integrated database; in this case Umberto software was used.

The end-of-life results in impacts due to the GHG emissions during decomposition at the landfill and also as a consequence of the volume of waste, which increases the footprint of plastic bags.

Options for alternatives to plastic bags were assessed which took into account the qualitative analysis of other environmental impacts in addition to those related to the category of climate change. International studies were not considered for comparison with the local context and the impact of disposable and reusable bags (or returnable bags: which have multiple uses to comply with the same function) was considered based on national studies.

As an alternative to the conventional plastic bag, the 100% recycled reusable bag may lead to environmental improvements in the categories of acidification, consumption of natural resources, ecotoxicity, human toxicity, land use and climate change, largely because there is no need for natural gas in the production of the plastic, nor for virgin raw material and this contributes to a reduction in the volume of post-consumption material in landfills. From the point of view of positive social impacts, the demand for recycled material may contribute to restructuring in the recycling market for inclusive and socio-productive recycling.

Guidelines for purchasing plastic bags

- For single-use plastic products, in particular bags, consider that these items are not abundant and the raw material normally comes from natural non-renewable (fossil) source tied to significant environmental impacts. Therefore it is essential to consider a reduction in the consumption of these products.
- Purchasing planning should consider disposability and favour reduction, reuse and recycling; it should also involve communication that guides on adequate consumption and disposal.
- Observe the occurrence of significant environmental impacts related to raw material extraction and end-of-life, in particular in terms of GHG emissions, the loss of biodiversity and the excessive use of land.
- The use of fuel for transportation from renewable sources and with a low level of GHG emissions.
- The use of recycled material instead of non-renewable raw materials.
- Verify compliance with labour legislation and work contracts.
- Display the proportions of post-consumption recycled plastic, ideally at 100%
- Look for guarantees in the origin of the post-consumption element aimed at originating from recycling, with the inclusion of cooperatives of recycling collectors.
- Give preference to the acquisition of reusable bags.

MDF table (medium density fibreboard)

Petrochemical resins and fossil fuels are the main contributors for carbon emissions. The timber originates from forestry, but the carbon absorbed by these trees returns to the atmosphere on their disposal, and is not a permanent storage for carbon.



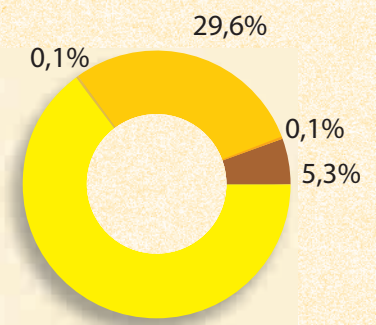
MDF table low pressure melamine laminate coating, 6 metal supports with height adjustment and a polyethylene finish. Measurements (cm): 140x74x70 (WxHxD); top: 140x70x2.5; side: 74x70x2.5; front panel: 135x45.5x1.8.
Function: to serve as a support for a variety of tasks commonly carried out in an office environment.
Fluxo de referência: 1 table
Processes not considered: packaging, leg supports, nails and screws, not considered due to mass, maintenance.

<p>40.17kg CO₂eq</p>	<p>0.08kg CO₂eq</p>	<p>18.29kg CO₂eq</p>
<p>ACQUISITIONS OF MATERIALS AND PRE-PROCESSING</p> <p>The production processes of the laminate and the MDF make the greatest contribution to the carbon footprint due to the petrochemical supplies and fossil fuels employed, the glue also has a considerable impact.</p>	<p>PRODUCTION</p> <p>Due to an absence of direct emissions because only electricity is used, the contribution here is superficial, largely because of the low emissions factor from the Brazilian electricity grid.</p>	<p>DISTRIBUTION AND STORAGE</p> <p>The total impact results from the use of fossil fuels, principally diesel, in the national transportation via roadways; this is the second most impactful stage in the life cycle.</p>

<p>0.03kg CO₂eq</p>	<p>3.29kg CO₂eq</p>
<p>USE</p> <p>Similar to the production stage, the impact here comes from the use of electric tools to put together the table. This process has a minimal impact when compared to the total emissions throughout the life cycle.</p>	<p>END-OF-LIFE</p> <p>The impact of transporting the material to a landfill site is small in comparison to the emissions throughout the life cycle. The carbon absorbed in the forestry stage is returned to the atmosphere at this stage.</p>



Carbon footprint



Discussion

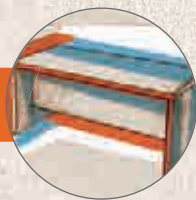
- Reductions in the thickness of the MDF and in the quantity of laminate used have a considerable impact on the table's carbon footprint.
- The relevant impacts are those related to loss of biodiversity and the consumption of natural resources through monoculture and the availability of timber from deforested regions.
- Chemical substances are employed, such as formaldehyde, solvents, and resins that increase the potential for toxicity.
- It is necessary to pay close attention to labour issues such as contracting, health and safety.

Recommendations and conclusions

- Guarantee that the timber comes from legal suppliers. If possible give priority to tracked, certified and/or sustainably managed timber.
- Restrict the use of dangerous substances, organic solvents and formaldehydes.
- Look for production processes with renewable energy sources.
- Correctly define the function so there is not an overestimation in the thickness of the MDF.

This example presents a carbon footprint study based on the concept of life cycle thinking, but is not a complete life cycle assessment. Method: GHG Product Protocol; Software: Umberto NXT CO₂; Ecoinvent Database and wherever possible or necessary, national or international data.

Information from the study¹



Study data and parameters

In order to measure the environmental impact in the category of climate change for the life cycle of an office table made entirely of MDF (medium density fibreboard), secondary data from the literature and from the *ecoinvent*² database were used.

At the acquisition of materials and pre-processing stage, in terms of emissions all the preliminary production processes for the MDF panels were considered, from the planting of trees, the production of the laminate finish, and the production of the glue to the transportation of the panels via road to the furniture manufacturer, at an estimated distance of 300km.

During the production of the table, electricity consumption was considered in the sawing and cutting of the MDF panels; the gluing of the laminate was done manually.

On leaving the Municipality of Sao Paulo, the tables were distributed by road among the twelve cities hosting the 2014 World Cup.

After daily use over a ten year period, the transportation and disposal of the table in landfill sites was considered.

Results and discussion

The acquisition of materials and pre-processing was the stage that most contributed to greenhouse gas emissions and was also the stage that led to the greatest environmental impact, mostly due to the production of the laminate and the MDF panels. The greenhouse gas emissions could be significantly reduced with the substitution of natural gas in the thermal plants with renewable sources of energy such as biomass and solar energy.

As a consequence of the burning of fossil fuels in transportation, the distribution and storage stage was the source of the second highest level of emissions in the table's life cycle and these negative environmental impacts could be reduced by adopting more efficient logistics for distribution.

Studies reveal that a reduction in the consumption of urea formaldehyde resin (UF) is also a crucial factor in the production of the table, once this reduction contributes to minimize the product's ecotoxicity.

¹ Full details are available in the technical report with bibliographical references at: www.fgv.br/ces

² The *ecoinvent* database is not free and must be accessed using software with an integrated database; in this case Umberto software was used.

Options for alternatives to the 100% MDF table were assessed taking into account the qualitative analysis of other environmental impacts, in addition to those related to the category of climate change. For example, the use of plastic wood results in parts that are similar to, or even a substitute for natural wood, with the advantage of being impermeable and resistant to attacks from pests and insects.

The manufacture of tables using recycled MDF may contribute to a reduction in the impact of the category of climate change, but studies suggest that this material contributes to deterioration in other categories of impact, such as the depletion of the ozone layer. Bamboo furniture has appeared as an alternative with lower environmental impact, largely due to its capacity to absorb carbon from the atmosphere in a short space of time; however, there is a lack of national studies on the theme.

Guidelines for purchasing tables

- Reconsider the real need for purchasing and look to reduce quantity, making improvements in conservation and carrying out repairs.
- Observe the occurrence of significant environmental impacts related to the contamination of water, air and soil
- Consult INMETRO and CONAMA norms and the criteria of labels and certifications such as FSC, Cerflor, NF 217 for furniture, the EU Flower label and Cradle to Cradle for furniture.
- Verify the technical norms and pertinent legislation on the adequate quantity of formaldehyde in the constitution of the panels and the other chemicals used, such as paints and solvents.
- Restrict the application of dangerous substances and organic solvent on the table's surfaces, both in the production and in use and maintenance.
- Demand a minimum guarantee that the timber comes from a legal source and is documented; prioritise the use of timber (and its derivatives) that is tracked, certified and/or from sustainably managed forestry.
- Consider legislation related to the use of water and programmes for reuse, reduction and treatment of water and industrial waste during the production stage.
- Provide incentives for adequate waste management: observe the quantity of and material used in packaging (giving preference to recycled and/or recyclables).
- Encourage the use of items with designs that prioritise the reduction of negative impacts in the life cycle as well as reducing the thickness of the MDF sheets.

Disinfectant

The supplies used in the product represent the greatest volume of carbon emissions, followed by distribution and storage. In the use of the disinfectant, the climate impact is concentrated on the treatment of sewage generated after the cleaning service.



0.993kg CO₂eq

ACQUISITIONS OF MATERIALS AND PRE-PROCESSING

The acquisition of the three chemical supplies corresponds to the majority of emissions, the active ingredient being quaternary ammonium, with the highest emissions (22%), followed by the sequestrate (10%) and surfactant (8%); water and packaging have less impact.



0.403kg CO₂eq

PRODUCTION

This is a highly energy intensive stage and is significant in the life cycle, despite not producing direct emissions from the generation of electricity. However, it was not possible to identify the production activity that leads to the highest use of energy.



0.418kg CO₂eq

DISTRIBUTION AND STORAGE

This is the second highest cause of emissions due to the burning of (mainly diesel) fossil fuels during national transportation, brought about by centralised production and decentralised distribution.



0.337kg CO₂eq

USE

The emissions are caused by the treatment of a large quantity of water in pre-dilution (47%) and the sewage generated following use of the disinfectant (53%).



0.01kg CO₂eq

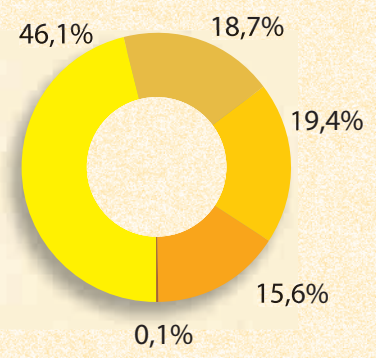
END-OF-LIFE

Emissions caused by the transportation of the material to recycling centres or landfill sites and the decomposition of plastic; however, these are negligible values compared to other stages.

Disinfectant restricted to pure use, with the active ingredient being quaternary ammonium.
Reference flow: 1 litre of disinfectant and 1 packaging
Function: sterilise environments in such a way as to remove pathogenic agents.
Processes not considered: additional cleaning utensils such as brushes, squeegees, cloths and buckets; fragrances.



Carbon footprint



- Acquisition of materials and processing
- Production
- Distribution and storage
- Use
- End-of-life

Discussion

- There are negative impacts which are highly relevant to the categories of toxicity and eutrophication resulting from the use of chemical compounds, which lead to the category of climate change not being the most significant.
- Products that are ready for use may represent greater impact per functional unit than concentrated products which are diluted in situ, due to the large quantities of water transported.

Recommendations and conclusions

- Prioritise concentrated products with lighter packaging and which have a larger capacity.
- Search for formulas that don't contain volatile organic compounds, biocides, fragrances, phosphorus and have lower toxicity.
- Inform and adequately train the final user prior to handling.

This example presents a carbon footprint study based on the concept of life cycle thinking, but is not a complete life cycle assessment. Method: GHG Product Protocol; Software: Umberto NXT CO₂; Ecoinvent Database and wherever possible or necessary, national or international data.

Information from the study¹



Study data and parameters

In order to measure the environmental impact in the category of climate change for the life cycle of the disinfectant, secondary data from the literature and the *ecoinvent*² database were used.

In the acquisition and pre-processing stage, fixed values for GHG emissions were considered which resulted from obtaining the chemical compounds (quaternary ammonium, ethoxylate alcohol – surfactant), treated water and the PET packaging. The distance by road to the factory varied from 10 to 60km.

During the production, the aggregation (mixing) process of the supplies and the packaging were considered.

On leaving the Municipality of Sao Paulo, the disinfectants were distributed by road transportation among the twelve host cities of the 2014 World Cup.

The disinfectant, which has an initial concentration of 20% of the active ingredient, is diluted during the use stage to 1 litre for every 499 litres of water, resulting in a concentration of 0.04% on this basis the pre-use treatment of water and the effluents generated are considered.

At the end-of-life stage, transportation by road of the packaging includes the following destinations: recycling sorting plants (5km), or landfill sites (50km) in a proportion of 59% and 41% respectively.

Results and discussion

The stage of acquisition of materials is the one which causes the highest GHG emissions and, therefore, is the focus for attention in the decision-making process. In this stage, the production processes involved in the three chemical supplies are what represent the largest sources of emissions. From the point of view of climate change, proposed improvements are related to the exclusion and/or substitution of these supplies, which calls for the need for a comparative LCA study among various classes of disinfectants. This is because category of impact on climate change is not of greatest concern, nor is it the most relevant in the analysis of chemical products; other categories may be more problematic from an environmental perspective, principally those of toxicity and eutrophication.

¹ Full details are available in the technical report with bibliographical references at: www.fgv.br/ces

² The *ecoinvent* database is not free and must be accessed using software with an integrated database; in this case Umberto software was used.

The alternative products assessed use the same active ingredient as the conventional product. The suggestion is to search for products with a higher concentration of the active ingredient. The alteration of the initial concentration of the active ingredient in the product studied, from 20 to 0.38% (the concentration of domestic disinfectants available in retailers), resulted in a 2285% increase in the carbon footprint.

It is also worth opting for packaging with a larger volume, which should also contribute to a reduction in emissions. In addition, it is important to note the environmental impact of the manufacturing of packaging, which is typically plastic, and is relevant in terms of the consumption of natural resources, electricity, water and GHG emissions.

To achieve a less impactful cleaning programme, which encompasses the procurement of products and procurement of services, it is worth considering activities related to: developing an inventory of products and services, calculating the area to be cleaned, including identifying areas that require specific cleaning and special products, training of staff, improvements to equipment (E.g. installing doormats at entrances to reduce accumulation of internal dirt and using highly efficient vacuum cleaners), cleaning according to need and not schedule.

Guidelines for purchasing cleaning products and services

- Search for formulas that don't contain Volatile Organic Compounds (VOCs), or whose toxicity and levels of volatility are as low as possible, avoid surfactants that are non-biodegradable, sequestrates, phosphorus, chlorine, biocides and fragrances.
- Verify the origin of vegetable oils (E.g. palm oil) with a view to avoiding products from deforested regions and which are ideally local.
- Provide incentives for the use of renewable sources for generating electricity in the production process.
- Guarantee the reduction and adequate management of waste.
- Verify the use of equipment for individual protection, particularly in handling chemicals and machinery.
- Guarantee compliance with labour and contracts law, as well as health and safety conditions.
- Prioritise products with higher concentrations of the active ingredient, display concentration on the specifications.
- Encourage the display of instruction for use and storage on the label.
- Guarantee legal origin of the product with complete information on the chemical composition, manufacturer details, date of manufacture and lot number.
- Supply communication and training activities for professionals in the area and to the consumer.

Typical Brazilian meal

The consumption of a typical Brazilian dish is associated with greenhouse gas emissions exclusively in the production of beef. In this life cycle, in addition to the emissions, the waste of food is also brought to attention.



12.41kg CO₂eq

ACQUISITIONS OF MATERIALS AND PRE-PROCESSING

Beef production is extremely carbon-intense due to enteric fermentation (ruminant digestion) and the manufacture of dried food. The impact of fruit is minimal when compared to meat.



0.14kg CO₂eq

PRODUCTION

64% of production emissions come from cooking with gas, the rest come from consumption of electricity, water treatment pre and post-use, gas production and waste transportation.



0.00kg CO₂eq

DISTRIBUTION AND STORAGE

There are no emissions at this stage since the food is not stored following its preparation and is served directly to the consumer.



0.00kg CO₂eq

USE

There are no emissions during consumption of the meal.



0.01kg CO₂eq

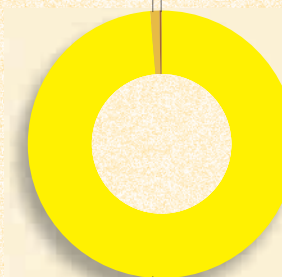
END-OF-LIFE

Part of the meal is considered as leftovers destined for landfill sites and emits GHG during the decomposition process. However, the emissions are insignificant in the context of the complete life cycle.

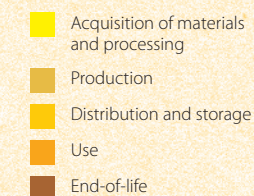


Carbon footprint

1,1% 0,1%



98,8%



Discussion

- In addition to climate change, there is a considerable impact on eutrophication and acidification due to the emission of ammonia in bovine manure.
- Intensive livestock farming in Brazil demands takes up areas of land, far more than is necessary.
- The farming of livestock often has a direct relationship with deforestation affecting the category of land use.
- The consumption of water (hydro footprint) is extremely relevant in beef production, but also in the production of rice in the meal.

Recommendations and conclusions

- Restriction of extensive livestock farming in areas of native forest or deforestation, with proof of origin supplied.
- Guarantee protection of bodies of water and riparian forest in pasture.
- Prioritise production with good livestock farming practice which seeks to improve on environmental performance in animal husbandry.

Information from the study¹



Study data and parameters

In order to measure the environmental impact in the category of climate change for the life cycle of a typical Brazilian meal, secondary data from the literature, the *ecoinvent*² database and the *LCA Food Database* were used.

At the acquisition and pre-processing stage, fixed values were obtained for the production of each ingredient (in kg CO₂eq/kg). Details on wastage and the loss of food were considered in five phases: livestock production, post-harvest handling and storage, distribution, processing, and consumption. The scale reveals that the quantity produced is more than necessary for preparation.

Each of the twelve supply products were transported from different regions to the host cities, at different distances varying from 1,412km to 2,244km.

Production, which begins in the kitchen, includes all preparation (washing, cooking), the use of liquid petroleum gas (LPG) in the oven and the use of electricity for the juicer.

Given that the meal is eaten at the production site, it is transported (by humans on foot) from the kitchen to the table, without causing emissions.

At the end-of-life stage, road transportation of food waste and disposal in landfill sites with capture and incineration of methanol was considered.

Results and discussion

Responsible for 99% of the carbon footprint, the initial stage represents the highest GHG emissions, which is directly related to beef production, a highly carbon-intensive process, due to ruminant digestion; following this is the production of dry feed. Other relevant social and environmental impacts are connected to livestock husbandry, with deforestation being a result of keeping herds and/or crops; high water consumption, and acidification and eutrophication due to animal which emits ammonia (NH₃).

Given that beef production is responsible for 94% of the GHG emissions, ways to reduce the impact of this activity were assessed, with a focus on improvements to the production system. Good Livestock Practices and the Plan for Low Carbon Agriculture both of which have been

¹ Full details are available in the technical report with bibliographical references at: www.fgv.br/ces

² The *ecoinvent* database is not free and must be accessed using software with an integrated database; in this case Umberto software was used.

proposed by Brazilian federal government, gather principles, practices, technologies, methods and recommendation to guarantee quality products and reduce GHG emission, affecting the production of supplies, animals, and food.

By way of curiosity, the studies consulted, which compare emissions from more common sources of animal and vegetable protein, show that the substitution of beef for salmon, egg, chicken or grains leads to a considerable reduction in the meal's carbon footprint.

Guidelines for purchasing beef

- Assess the potential environmental impact in the production and supply chain, particularly those related to water, air, and soil contamination and deforestation.
- Verify norms and legislation on the use of chemicals (pesticides and other supplies), water, and effluents, as well as the protection of bodies of water including riparian forest in pasture.
- Restrict the use of fire or impactful techniques in the management of pasture.
- Check conservation and land recovery programmes.
- Incentivise the adequate reduction and management of agroforestry waste and the treatment of animal manure (E.g. anaerobic digestive systems for organic material, use of biogas and compost/biofertilizers).
- Insist on Rural Environmental Registration (CAR) as well as compliance with rural registration with the National Institute for Agrarian Colonisation and Reform (INCRA), and the Inland Revenue, guaranteeing important information on rural property, land management, capacity index.
- Verify availability of information on the herd based on tracking.
- Search for activities that reduce GHG emissions in the production system.
- Prioritise local products from small and medium producers.
- Require compliance with programmes and activities that guarantee the well-being of the animals and vegetation in terms of the herd.
- Verify refrigeration certification with the Ministry of Agriculture (MAPA).
- Verify compliance with criteria established by Integrated Livestock Production (PI Brasil).
- In the procurement of catering services: minimise the quantity of meat offered and products that contain meat and include vegetarian options which emit considerably less GHG.

Football match

The carbon footprint of a football match was measured with a view to assessing the GHG emissions of an emblematic event – in this case, the final of the 2014 World Cup at the Maracanã Stadium in the Municipality of Rio de Janeiro.



AIR AND ROAD TRAVEL

11,937.38t CO₂eq

The transportation of people from their place of origin to Rio de Janeiro revealed itself as the factor most responsible for the footprint. National and international air travel represents more than 80% of the total emissions and road travel represents over 10%, more than any other group.

CATERING

406.22t CO₂eq

Despite representing less than 5% of the total GHG emissions, this group is the second highest due to the production of commercialised food. The large numbers of people involved raises the footprint above other groups.



ENERGY

67.61t CO₂eq

Third most representative group, but insignificant in terms of the total footprint, emissions from electricity and generators were similar.

URBAN MOBILITY

12.86t CO₂eq

Movement within the Municipality of Rio de Janeiro is insignificant in terms of GHG emissions. Incentives for using public transport and easy access to the stadium are fundamental to this result.



INFRASTRUCTURE

18.57t CO₂eq

Renovations to the stadium for the World Cup represent a negligible footprint when compared with other groups.

WASTE

6.27t CO₂eq

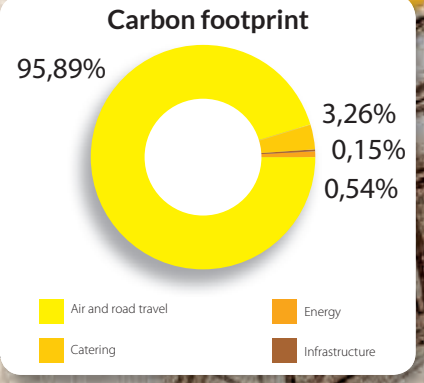
Transportation to landfill sites and decomposition of waste was irrelevant.



WATER AND EFFLUENTS

0.38t CO₂eq

Activities related to acquisition and necessary treatment were not revealed to be of significance in the total footprint.



Information from the study¹



Study data and parameters

The choice to study a football match is justified by its global significance and the popularity of the sport, which, particularly in Brazil, engages considerable private and public efforts.

In order to elaborate the inventory of greenhouse gases emitted in the context of a football match, unlike the other studies carried out, the concept of life cycle thinking does not apply, and so adjustments are required to the conventional approach, and as a result, a rethinking of calculation methods. This is because calculating emissions for an event cannot be done with methods for products, corporations or regions.

The chosen context was the final match of the 2014 FIFA World Cup which took place on 13/07/2014 at the Maracanã Stadium in the Municipality of Rio de Janeiro. In the absence of a method for calculating the emissions for events, references were analysed that assist in defining the parameters of the study.

The sources of emission for the football match were divided into six groups, based on studies that measure the impact of major events:

- 1 Water and effluents:** the use of 7 litres of water per person in bathrooms, originating from a supply and sewage treatment system generated in station.
- 2 Catering and waste:** food and beverage production, including packaging, to offer 1 meal and 2.2 drinks per person with a guarantee of 20% more; road transportations of the waste generated and the decomposition process of organic material.
- 3 Energy:** energy supply sufficient for the match to occur and be broadcast; includes electricity used at the stadium, both from the grid and local generators supplied by solar panels or diesel generators.
- 4 Infrastructure:** permanent physical changes made to the Maracanã stadium prior to hosting the World Cup.
- 5 Urban mobility:** all movement within the Municipality of Rio de Janeiro under the control of the organisers: public transport, delegations, escort of delegations, official vehicles - individual private transport were not considered.
- 6 Transport:** all air and road travel, outside the Municipality of Rio de Janeiro, which took the public, delegations and journalists to the match location.

In order to measure the environmental impact in the category of climate change for the football match, secondary data from the literature such as reports of emissions from the 2010 World Cup, 2012 Olympics and when possible data from studies leading up to the 2014 World Cup were used, in addition to data from the *ecoinvent*² database.

Results and discussion

The transport group represents the highest level of GHG emission within the parameters analysed, and air travel corresponds to 86% of this due to the fact that almost 70% of the public opted for this form of transport, associated with the long distances travelled, principally in the context of international air travel.

Air transport is the leader among the emissions for the match because of the burning of aviation fuel, a derivative of petroleum which is also relevant to other categories of environmental impact, such as acidification in the context of acid rain.

Among the alternatives, few paths for mass reduction or substitution of air transport were found for spectators at a football match. The individual choice of a mode of transport to arrive at the stadiums, despite being open to receiving positive incentives for its substitution, comes up against problems when the proposal is to substitute air for road travel, particularly when distances are great.

The nearest and most plausible option from an environmental perspective is to improve the performance of air travel, by changing the form of the fuel, for example. One possible substitute would be biokerosene which has already overcome the technical barriers for use and should become affordable.

One of the main advantages is the reduction in the GHG emissions, which is approximately 65% to 80% taking into consideration the fuel life cycle. Another advantage is the absence of sulphur in the composition of the biofuel which leads to a major reduction in acidification. There is a reduction in two other categories of environmental impact: depletion of the ozone layer and depletion of fossil fuels.

In order to achieve social and environmental gains in the context of a major event, it is necessary to look at the negative impacts from an integrated perspective based on planning, and as such, opt for activities that favour a positive legacy for the event's host nations.

¹ Full details are available in the technical report with bibliographical references at: www.fgv.br/ces

² The *ecoinvent* database is not free and must be accessed using software with an integrated database; in this case Umberto software was used.

Chapter highlights

- The complexity of the environmental challenge demands a broad and complete vision of positive and negative impacts throughout the production, use and disposal of products, as is seen in the Life Cycle Assessment (LCA).
- The LCA was created in the 1960s and with the technological evolution in the development of databases today represents a powerful tool for a more sustainable management of production and consumption.
- Major events represent an opportunity to put a life cycle perspective into practice in procurement with the potential to replicate the experience in public and private institutional consumption.



Legacies for a mega-diverse country

The path to the consolidation of sustainable consumption

Travelling from the North to the South of Brazil means encountering a world of cultural manifestations that perhaps few other countries share. This combination of peoples and ethnicities, variations in climate, and diverse foreign influences, has contributed to forming a cultural diversity unrivalled throughout the world. The same country that each year hosts a folkloric festival strongly inspired by indigenous culture, like the Festival de Parintins, in Amazonas, also becomes an extension of Bavaria thanks to the celebration of Oktoberfest in Blumenau, the largest of its kind outside of Germany. The dispute between the Caprichoso and

Garantido *bois-bumbás* attracts 70 thousand tourists every year and doubles the population of the Amazonian municipality injecting more than R\$50 million into the local economy. Each boi presentation costs around R\$6 million and attracts a legion of sponsors, each of whom vies for brand space at the Bumbódromo, the arena that hosts the presentations and which has a capacity for 35 thousand visitors. Oktoberfest, meanwhile, over the course of almost a month, is visited by approximately 500 thousand people, who, according to estimates from the Ministry of Tourism, pump R\$100 million into the region's economyⁱ.

In the Northeast, more than two million people keep the Junina Festival alive, a tradition inherited from the Portuguese but which has come to incorporate regional influences both in food and dance styles such as xote and forró. However, no other cultural manifestation receives as much attention and engages as many resources as Carnival, the main event in Brazil's calendar, which, by virtue of its many facets, from the Rio parades, to the frevo traditions in Pernambuco and the euphoria of the Bahian festivities draws crowds by the hordes. It's a billionaire celebration: no less than R\$ 6.1 billion floods into the Brazilian economy, and the event attracts 6.4 million visitors, according to the Ministry of Tourism. The flux of tourists in Rio de Janeiro approaches one million people, while 250 thousand jobs are generated directly and indirectlyⁱⁱ.

Beyond the festivities, Brazil has established itself in recent years as a destination for business and scientific studies, growing by 20% annually and today leads the ranking of Latin American countries for hosting international events such as fairs and congresses. Today the country is the 7th most frequent host for events in the world, according to the International Congress and Convention Association, and one in four foreigners who visit Brazil come here to close business deals or acquire new knowledge. One example of this was Rio+20, the UN conference for Sustainable Development, which took place in June of 2012. With more than 45 thousand participants, the environmental conference became the largest event the United Nations had ever organised anywhere in the world, and hotels in Rio reached 95% capacity during the nine days of the conferenceⁱⁱⁱ.

The cultural, sporting and intellectual effervescence present in these major events, which move billions in the country's economy, is matched by the potential social and environmental impacts of their execution tied to waste management, energy, and infrastructure, etc., and they have similar characteristics in terms of creating opportunities favourable to sustainable institutional procurement – a powerful economic tool for qualifying demand and for shifting paradigms – with the additional possibility of influencing, through example, or by means of incentives, the individual purchases of citizens. “Mega-events are more than just huge gatherings of people in a given place. Their essence is not in their physical size itself, but in the planetary reach they possess. Sport, music, and culture end up being, as a consequence, media for other messages: of consumption, selling ideas, political propaganda for countries, and the construction of global brands”, affirms Anderson Gurgel, researcher in Communication and Sport and professor at Universidade Mackenzie^{iv}.

Diverse perspectives

Recognising and analysing the impacts that arise from decision-making – be it in the context of events, or everyday activities – is made possible through a life cycle approach, which provides a systemic view of inter-relationships between human activities and the environment. From this perspective, it is possible to consider and to facilitate the integration of sustainability into planning and execution.

There is already a clear perception among people about the environmental and/or social impacts generated by choosing a particular product, even though it might not be a technical perspective. To some degree, it is known that there is a relationship between: the consumption of beef and deforestation in the Amazon; excessive consumption and disposal of paper used in offices; road transportation of products and excessive GHG emissions that result from burning fossil fuels. Technical studies based on life cycle thinking, such as this initiative, help reinforce for all involved that it is necessary to have a complete vision of the entire chain in order to comprehend which of these “common

perceptions” actually occur in the life cycle of a product, and which are the critical points in this cycle that allow the procurement decision to minimise or entirely remove impacts.

The factors that lead each agent to procure an LCA study and the respective benefits they will obtain from this information will vary. The motivation for doing so will also influence the category of environmental impact chosen for each decision-making process – focussing on carbon footprint studies means targeting one single environmental impact – that of climate change. We have spoken here of civil society (citizens), of institutional buyers (public or private), and of the supply market (producer and process manager), all of whom ought to, in their diverse fields of work, adopt a mode of thinking about products by observing the impacts starting from the extraction of raw materials, up to the end-of-life, in order to choose the best alternative.

The **citizen**, in their role as individual consumer, stands to benefit from this information as it assists them in their everyday purchases made from the vast array of goods and services available, allowing them to leave behind the restricted conception of “price” (price tag value) and replace it with “cost” (the effective value of the acquisition which includes positive and negative externalities). Access to the results of an LCA study – through labelling, tracking systems with details on origin and life cycle activities, or advertising – makes it possible for the citizen to find more qualified information on:

- what the initial stages of the life cycle (acquisition of materials and production) mean in terms of consuming energy, generating dangerous waste, threats to ecosystems, and air, water or soil pollution.

The World Cup involved projects to offset the carbon emissions resulting from the event and the collection of recyclables by recycling collectors

- The existence of initiatives created by the manufacturer, distributor, or retailer that address social and environmental issues and minimise the negative impacts generated by their operations.
- Instructions on adequate use and disposal during the use and end-of-life stages.

By taking a look at the seven studies presented in Chapter 3, and with the understanding that the use phase of the cotton t-shirt represents the greatest carbon footprint in the cycle, the individual consumer can potentially be guided by the manufacturer on ways of adapting or improving use, for instance prioritising hand washing, open air drying, and,

Sustainable construction is one of the opportunities provided by mega-events, reflected in procurement policies

if ironing is required, reducing as much as possible the time spent doing so, as well as acquiring irons that are more efficient in terms of energy consumption.

In institutional procurement, **governments and businesses** are those who call for LCA studies and are also beneficiaries of the results. This information, in addition to guiding public and private policy, codes of conduct, manuals for good practices or management directives, makes it possible

for these agents to benefit from LCA studies in order to:

- Facilitate the prioritisation of governmental programmes and business activities based on the potential and principal environmental impacts that are revealed.
- Develop more solid public policies and economic instruments, taking into consideration the characteristics and the integration of agents in the value chain: consumers, producers, suppliers and retailers.
- Reduce the environmental impact, making use of the power of government

procurement and the purchasing of major institutions by means of market incentives that offer – or which may develop – products with a better environmental performance with focus on the main negative impacts.

- Support the creation of reverse logistics systems that contribute with an economy based on minimising waste and increasing recycling.

The understanding within public administration that the majority of the environmental impacts that stem from a typical Brazilian meal occur during beef production (see Chapter 3), may result in significant incentives for suppliers to improve on their processes. Public policies on the acquisition of food and the procurement of catering services, when integrated with sustainability attributes, would strengthen the market in terms of good livestock farming practices based on the knowledge that there will be a constant demand.

From the manufacturer’s perspective, the **production sector** is motivated to carry out an LCA study through the possibility of advances in production management and operations by minimising the creation of sewage, financial costs, waste in various contexts, and the negative impacts, and will ultimately bring value to the final product making it more competitive. As such, they will be faced with opportunities which include:

- Assessing, reporting and mitigating environmental impacts from the production cycle in order to bring transparency into product information, and improve brand reputation and value, opening access to more demanding markets.
- Identifying risks and opportunities for improvements together with suppliers, customers and other agents based on sharing information on the impacts from the stages in the cycle, in turn optimising the use of resources.
- Creating projects for products based on information about the potential impacts inherent in the use of a range of raw materials, by employing different technologies and even through the different waste generated.

Improvements in the production process can be delivered based on the information revealed by the carbon footprint for the MDF table study in Chapter 3: the substitution of natural gas, the fuel used in the thermal plant during the production stage of the laminate and the MDF board, could significantly reduce the GHG emissions during the life cycle. The study on the football match leads to conclusions on waste management and the high level of greenhouse gas emissions created by air transport, which can be applied to the management routines of businesses and government bodies.

The delivery and results of the studies for the “Sustainable Procurement & Major Events” initiative should be applied to other goods and services with a view to serve as inspiration for life cycle thinking and should also become a technical reference for products that make use of similar raw materials (E.g. timber, plastic, etc.) and which therefore cause similar environmental impacts. It is worth remembering that reviewing a procurement process in which there is planning and reflection on the actual need for the given product can result in significant reductions to environmental impact.

Learning from life cycles

The road to sustainability is being paved thanks to the contribution of major events. Today, no cultural, religious, or sporting encounter has the chance of success if it does not incorporate sustainability attributes into its execution. Themes such as the social and environmental certification of suppliers and incentives for mobility and construction with a lower carbon footprint are on business agendas today due to climate change and concerns about institutional responsibility and reputation.

In this context, incorporating sustainability into an event will involve passing through many levels throughout the decision-making process, in particular those involving purchasing and procurement, making this an essential feature of the strategy in the context of an entire life cycle – from the planning stage to the event's end-of-life – lift this agenda out of peripheral discussions and making it, once and for all, a priority.

A look at small businesses

International estimates indicate that consumption by public authorities represents between 8% and 25% of Gross Domestic Product (GDP). When the private sector's contribution is added to this, the weight of institutional procurement in different supply chains becomes evident. Today such purchases must adopt practices that comply with policies and meet targets for sustainability in large businesses engaged in procurement. As a result, there is an increased capillarity in technologies, products and management models that incorporate social and environmental issues, with the power to reduce the concentration of income and build business opportunities – a vein which also opens up to any micro and small businesses that are attentive to market trends in terms of responsible consumption. In the case of mega-events, this potential is even more pronounced.

“Smaller businesses benefit when the focus is on local development, generating jobs and income”, according to the analysis of Suênia Sousa, director of the Sebrae Centre for Sustainability in Cuiabá (MT). From buffet services that offer natural foods on the menu, to equipment hire and arrangements for visiting delegations, small businesses are forced to adapt to the demand for products with a lower environmental impact at the insistence of events organisers, as was the case in the World Cup. “We are underprepared and still have a long way to go to meet the criteria of this agenda”, warns Suênia, suggesting the greater integration of institutions, businesses, governments and universities in order to make progress in the sector^{viii}.

A local purchase is a requirement of sustainability from the perspective of including small businesses and producers and showing respect for traditional knowledge and regional realities.

By pursuing social and environmental attributes, decisions today are centred on what is “good” in such a way that the purchaser today tends to incorporate, with increasing emphasis, something which represents a “good” for society. As such, the concept of “advantage” in the public and private sector, as well as in individual consumer purchasing, takes into account not only the lowest, but also the “best” price – which represents long-term cost efficiency with a focus on the well-being of the population and the sustainability of the planet.

The understanding of what offers greater advantage to an institution and to society in terms of positive and negative externalities leads buyers and managers to question which goods and services

A society connected as a network fosters the debate on events and its contribution to sustainable development

are actually capable of offering better social and environmental performance, be it in the context of major events, or in everyday living. An approach that will help in this, as we have seen, is a tool for measuring environmental impact: the Life Cycle Assessment (LCA), a field of knowledge that is gaining momentum due to its wide ranging vision of environmental impacts that take place throughout a product’s life cycle, beginning with the extraction of raw materials, passing

through use and ending with disposal as detailed in Chapter 3 of this publication.

The movement to support the LCA, which is, nowadays, largely restricted to academy and industry, is constantly evolving and, increasingly reaching, through a transversal approach, public and private policies – as exemplified by the National Policy on Solid Waste (*see Chapter 2*). Such policies may benefit from the results of LCA studies in delivering improvements to the production process management, assessing impacts and risks, and stimulating more sustainable procurement. This is a complex tool, with specific technical directives for developing studies which need to be conceptualised so that the agents

(public administration, private sector, and citizens) can understand their relevance, interpret their results and employ them correctly.

One of the “Sustainable Procurement & Major Events” initiative’s contributions to this movement is precisely that of raising awareness about the LCA tool and life cycle thinking with a view of stimulating a systemic vision of procurement decisions. The carbon footprint studies of seven emblematic items, purchased for major events, and for the most part, also present in the everyday purchases of institutions, stands as a legacy to inspire progress and debates on the theme. The intention is to support decision makers with information that has a certain scientific rigour, and which is appropriate to the Brazilian context.

Through rock stars or football idols’ influential power, major events help to fuel the exchange of information and the dissemination of good practices: they are window displays seen by millions of people. As such, they generate multiple perspectives on products, impressions on being, or not-being, sustainable, and different ways of seeing the world. A great window is opened to the world making consumption a vector in the search for global sustainability and without a deadline.

The green road to the Olympics

Together with federal, state and municipal governments, the Organising Committee for the 2016 Olympic Games developed the Sustainability Management Plan (PGS), which establishes the fundamentals for sustainability in the games planning and management. The plan has three strategic objectives (Planet, People and Prosperity) which revolve around nine themes which include transport and logistics, sustainable design and construction, environmental conservation and recuperation, waste management, diversity and inclusion, universal accessibility, engagement, and sustainable supply chains, among others.

In the area of transport, for example, the objective is that by 2016, the use of high capacity public transport systems (trains and underground) will increase from 12% of total commutes to 60% and will include train, underground, BRT and LRT, in turn reducing the need for journeys on individual transport. In the context of the construction industry, the challenge is to avoid creating underused installations with high maintenance costs. Consequently, of the group of 36 sporting structures being used for the event, the eleven being built as permanent installations must comply with international Leed certification and the Procel label (National Programme for the Conservation of Electrical Energy) for energy efficiency. And it doesn't end there. The hope is to reduce water pollution by 80% in the Baía de Guanabara by 2016.

The presence of sustainability in the Olympic Games plans goes hand in hand with Rio's scenic beauty and the city will, once more, be the subject of international attention providing yet another opportunity for opening up the debate on the role the forests play in

maintaining quality of life in major urban centres, and on how our procurement decisions can contribute to preserving them.

In addition to the benefits associated with reputation, both for the Olympic Games and for the city itself, social and environmental standards expressed in the PGS also make a commitment to spreading and supporting new standards for sustainability in Brazil's events sector. According to the document, "the Games have great potential to influence the behaviour of other businesses, particularly in the events sector" and promises to develop strategies for influencing sustainable production chains – among them, the food production chain.

According to Maurício Voivodic, Executive Secretary of the Institute for Forestry and Agricultural Management and Certification (Imaflora), the initiative has already taken the first steps. The organisation is a pioneer in Brazil in the certification of FSC systems (forestry products) and the Rainforest Alliance (livestock farming with good social and environmental practices). "We have formulated, along with a group of NGOs, a report for the COI which provides a complete list of food products that exist in the Brazilian market today with sustainability certification", says Voivodic. The idea is to show that there are sustainable alternatives for almost any type of food served during the Games, such as meat, eggs, dairy products, fruit and vegetables, coffee, sugar, nuts and açaí – making the supply of these products a rule during and after the event. "In facing the demand for products that have been shown to be sustainable, we have noted a major progress in the production chains as a whole, as many producers will look for better sustainability standards in order to win market share", Voivodic concludes^{vi}.

Chapter highlights

- Brazil's natural and cultural diversity and its presence on the global stage, attracts major events with the potential to replicate activities related to sustainable purchasing and procurement.
- The experience of hosting the World Cup and Olympic Games is strategic in the context of a continuous learning process that will allow the country to maximise social and environmental gains through mega-events.
- One of the contributions of the Sustainable Procurement & Major Events initiative is to disseminate the use of the LCA tool and life cycle thinking with a view to stimulating a systemic vision in procurement decisions.
- The seven carbon footprint studies on products acquired at major events, most of which are also purchased by institutions and individuals, assist decision makers in a variety of ways by supplying them with technical information.
- Major sporting and music events that take place in Brazil and throughout the world build on experiences through adopting sustainability criteria and serve as a reference for managers who seek to make sustainable purchases.
- The visibility of major events strengthens processes of participation and the debate on social and environmental issues, in particular in the scenario of a society that is increasingly connected via networks

Allocation – The sharing of environmental impacts among products that result from the same process.

Biogenic Emission – The emission of CO₂ from biofuels is called biogenic emission. Both fossil fuels, derived from petroleum, and biofuels, are organic molecules that originate from photosynthesis. The essential difference between them, from the point of view of emissions, is that fuel derived from petroleum uses, in the combustion of carbon, molecules that have been stored for hundreds of millions of years in oil deposits, emitting carbon dioxide into the atmosphere in an extremely long carbon cycle, altering the actual chemical composition of the atmosphere. In the case of biofuels, the carbon cycle is shorter, in other words, all the carbon emitted into the atmosphere during combustion was absorbed at the beginning of the cycle, by means of photosynthesis, in the production of the biofuel.

Carbon dioxide equivalent (CO₂ or CO₂eq) – Common unit for comparing emissions of various greenhouse gases; represents the quantity of emission of carbon dioxide (CO₂) that causes the same impact on climate as an amount emitted by greenhouse gas or a mixture of greenhouse gases. The carbon dioxide equivalent is obtained by multiplying the emission of greenhouse gas by its Global Warming Potential (GWP).

Carbon footprint – Technique for evaluating the climate impact of a product throughout its entire life cycle, calculated in carbon dioxide equivalent (CO₂eq).

Category of environmental impact – A class that represents relevant environmental issues to which the results of the study may be associated.

Consumption – Act or effect of consuming, wasting, extracting merchandise, and the application of wealth in order to satisfy the economic needs of human beings.

Environmental impact – Any alteration to the physical, chemical and biological properties of the environment caused by any type of material or energy that results from human activities which, directly or indirectly, affect the health, safety and well-being of the population, social and economic activities, the biota, the aesthetic and sanitary conditions of the environment and the quality of natural resources.

Function – Role to be played by a product throughout its life cycle.

Functional unit – The quantity of a material to be used in the design of each process, with reference to inputs and outputs. It reflects the technical characteristics of the product under analysis.

Global Warming Potential (GWP) – A factor that describes the impact of the radiative force of a unit based on the mass of a given Greenhouse Gas (GHG) relative to a unit of carbon dioxide equivalent during a given period.

Greenhouse Effect – A phenomenon which occurs when gases, such as carbon dioxide, behave like the glass walls of a greenhouse, trapping heat from the Earth's atmosphere and preventing it from returning to the stratosphere.

Greenhouse Gases (GHG) – Natural and anthropic gaseous components in the atmosphere that possess the property of keeping heat close to the Earth's surface. In this study we will consider the following gases: CO₂, CH₄, N₂O, HFCs, PFCs, SF₆ and NF₃.

Life Cycle – The necessary stages for a product to comply with its function, which ranges from obtaining natural resources to its final disposal after it has served its function.

Life Cycle Assessment (LCA) – Technique for evaluating the environmental performance of a product throughout its entire life cycle, by identifying the human activities that occur and the assessment of the environmental impact potentially associated with these activities.

Life Cycle Costing – This evaluation addresses the optimisation of money in the case of the ownership of goods, taking into consideration all the costs of its operational life.

Life Cycle Thinking – Concept characterised by applying a systemic perspective – qualitative in nature – to the environmental impacts of a product from “cradle to grave” or in other words, from the extraction of raw materials to the final disposal of the product.

Process map – Flowchart containing all the processes considered in the life cycle of a product. Also known as a **product system**.

Product – An object for which a life cycle study is performed; any goods or service.

Product system – See **process map**.

Procurement management (or supply management) – Segment of the Administration of Materials that aims to supplement the need for materials or services, through quantitative and qualitative planning, verifying that what is purchased is received and the adequate use and disposal of the product.

Reference flow – The quantity of a product required to meet the function defined in the scope of the study. It serves as the base for the results of the study, in other words, all the results presented reflect the environmental impact of the quantity for the product defined in the reference flow.

Sensitivity analysis – Alteration of variables that were adopted as premises for the study with the aim of understanding what the impact of these decisions will be on the final result.

Sustainability – Principle according to which the current use of natural resources cannot compromise the ability to meet the needs of future generations.

Sustainability attribute – For procurement management, we have highlighted five sustainability attributes: environmental, diversity, security, human rights, and acquisitions made by local small businesses.

Sustainable development – “...development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (Brundtland Report).

Value chain – A combination of activities which create value; starting with the sources of basic raw materials and passing through the suppliers of components, delivery to the final consumer, leading up to the post-consumption phase. The relationship and engagement of the company with its diverse public may also create value.

1

Major events and the social and environmental challenges for the planet

i REIS, A. C. (2010). **Cidades Criativas, Soluções Inventivas**: o papel da Copa, das Olimpíadas e dos museus internacionais. São Paulo: Garimpo Soluções.

ii BELO HORIZONTE. Decreto n. 13.792, de 2 de dezembro de 2009. Regulamenta a Lei nº 8.762, de 16 de janeiro de 2004, que “Dispõe sobre o Calendário Oficial de Festas e Eventos do Município”, e a Lei nº 9.063, de 17 de janeiro de 2005, que “Regula procedimentos e exigências para a realização de evento no Município”. Diário Oficial do Município de Belo Horizonte. Disponível em: <http://www.legisweb.com.br/legislacao/?id=172641>. Acesso em: 20 out 2013.

iii BRASIL. Decreto n. 7.682 de 28 de fevereiro de 2012. Altera o Decreto nº 7.538, de 1º de agosto de 2011, para alterar o rol de grandes eventos abrangidos pelas competências da secretaria extraordinária de segurança para grandes eventos do Ministério da Justiça. Disponível em: http://www.planalto.gov.br/ccivil_03/_Ato2011-2014/2012/Decreto/D7682.htm. Acesso em: 20 out 2013.

iv HALL, C.M. (1989). **Hallmark Tourist Events**: Analysis, definition, methodology and review. In: Syme, G.J., Shaw, B.J., Fenton, D.M. and Mueller, W.S. (Eds). 1989. *The Planning and Evaluation of Hallmark Events*. Aldershot. Avebury.

v ABNT – Associação Brasileira de Normas Técnicas. **Rótulo Ecológico para Eventos Sustentáveis**. PE-239.02. Maio, 2013. Disponível em: http://rotulo.abnt.org.br/pdfs/PE-23902_RotuloEcologicoeventosustentaveis.pdf. Acesso em 27 set 2013.

vi ABNT – Associação Brasileira de Normas Técnicas. **Sistemas de gestão para sustentabilidade de eventos — Requisitos com orientações de uso**. ABNT NBR ISO 20121:2012.

vii UNEP – United Nations Environment Programme; ICLEI – Local Governments for Sustainability. **Green Meeting Guide 2009**: roll out the green carpet for your participants. Disponível em: <http://www.unep.org/pdf/GreenMeetingGuide.pdf>. Acesso em: 20 set 2013.

viii GRI - Global Reporting Initiative (2012). **Sustainability Reporting Guidelines and Event Organizers Sector Supplement**. Amsterdam, Netherlands: GRI. Disponível em: <https://www.globalreporting.org/reporting/sector-guidance/sector-guidance/event-organizers>. Acesso em: 20 set 2013.

2

The force of the laws and norms that induce sustainable procurement

i, v BETIOL, Luciana. **Contratações Públicas como Indutoras de Sustentabilidade**: a perspectiva do consumo sustentável. Avanços e Desafios no cenário jurídico brasileiro. 351p. Tese (Doutorado em Efetividade do Direito) – Pontifícia Universidade Católica de São Paulo (PUC). São Paulo, 2013.

ii BETIOL, Luciana S. et al. **Compra sustentável**: A força do consumo público e empresarial para uma economia verde e inclusiva. 1ª. ed. São Paulo: FGV, 2012.

iii UNGC - UNITED NATIONS GLOBAL COMPACT. **Supply Chain Sustainability**: a practical guide to continuous improvement. New York: UNGC; BSR, 2010.

iv COSTA, Daniela V.; TEODÓSIO, Armindo dos Santos. **Desenvolvimento sustentável, consumo e cidadania**: um estudo sobre a (des)articulação da comunicação de organizações da sociedade civil, do estado e das empresas. Rev. Adm. Mackenzie - online (RAM), São Paulo, v. 12, n. 3, p. 114-145, Maio/Jun. 2011.

vi GVCES – Centro de Estudos em Sustentabilidade. Disponível em: <http://www.gvces.com.br/index.php?r=site/conteudo&id=28>. Acesso em 01 out 2013.

vii GRI – Global Reporting Initiative. Disponível em: <https://www.globalreporting.org/>. Acesso em 01 out 2013.

viii SUSTAINABILITY INDICES. Disponível em: <http://www.sustainability-indices.com/>. Acesso em 01 out 2013.

ix ISE – Índice de Sustentabilidade Empresarial. Disponível em: <https://www.isebvmf.com.br/>. Acesso em 01 out 2013.

x ETHOS – Indicadores Ethos para Negócios Sustentáveis e Responsáveis. Disponível em: <http://www3.ethos.org.br/conteudo/iniciativas/indicadores/#.Ulfyqyq5dIY>. Acesso em 01 out 2013.

xi ABNT – Associação Brasileira de Normas Técnicas. Disponível em: <http://www.abnt.org.br>. Acesso em 01 out 2013.

3

A new look at decision making

i, ii, iii, iv CETEA – Centro de Tecnologia de Embalagem. **Avaliação do Ciclo de Vida**: Princípios e Aplicações. Centro de Tecnologia de Embalagem e Compromisso Empresarial para Reciclagem (CEMPRE), Campinas, 2002.

v UNEP - United Nations Environment Programme. **Global Guidance Principles for life cycle assessment databases**: A Basis for Greener Processes and Products. United Nations Environment Programme, 2011.

vi WRI - WORLD RESOURCES INSTITUTE. **The Greenhouse Gas Protocol**. Product Life Cycle Accounting and Reporting Standard. Washington, DC: 2011.

vii BETIOL, Luciana S. et al. **Compra sustentável**: A força do consumo público e empresarial para uma economia verde e inclusiva. 1ª. ed. São Paulo: FGV, 2012.

viii BETIOL, Luciana. **Contratações Públicas como Indutoras de Sustentabilidade**: a perspectiva do consumo sustentável. Avanços e Desafios no cenário jurídico brasileiro. 351p. Tese (Doutorado em Efetividade do Direito) – Pontifícia Universidade Católica de São Paulo (PUC). São Paulo, 2013.

4

Legacies for a mega-diverse country

- i, ii** MINISTÉRIO DO TURISMO. **Festival de Parintins deve atrair 70 mil turistas.** Disponível em: <http://www.turismo.gov.br/turismo/noticias/todas_noticias/20130628-1.html>. Acesso em: 07 nov. 2014.
- iii** ORGANIZAÇÃO DAS NAÇÕES UNIDAS. **Rio+20 em números.** Disponível em: <<http://www.onu.org.br/rio20-em-numeros/>>. Acesso em: 27 jun. 2014.
- iv** GURGEL, A. Anderson Gurgel: depoimento [2014]. Entrevistadora: Andrea Vialli. São Paulo: Universidade Mackenzie. Entrevista concedida ao Centro de Estudos em Sustentabilidade da FGV para a elaboração deste livro.
- v** RIO 2016. Plano de Gestão da Sustentabilidade dos Jogos Rio 2016™. Versão 1 – Março 2013. Rio de Janeiro: 2013. Disponível em: http://rio2016.com/sites/default/files/parceiros/plano_gestao_sustentabilidade_ago2013.pdf. Acesso em 27 nov 2013.
- vi** IMAFLORA - Instituto de Manejo e Certificação Florestal e Agrícola. Piracicaba. Apresenta recursos e atividades desenvolvidas. Disponível em: <<https://www.imaflora.org>>. Acesso em: 07 nov. 2014.
- vii** BETIOL, Luciana S. *et al.* **Compra sustentável: A força do consumo público e empresarial para uma economia verde e inclusiva.** 1ª. ed. São Paulo: FGV, 2012.
- viii** SUÊNIA, S. Suênia Sousa: depoimento [2014]. Entrevistador: Sérgio Adeodato. São Paulo: SEBRAE. Entrevista concedida ao Centro de Estudos em Sustentabilidade da FGV para a elaboração deste livro.

Glossary

- i** SILVA, G. A. da; KULAY, L. A. **Avaliação do ciclo de vida.** In: JÚNIOR, A. V.; DERMAJOROVIC, J. (orgs.). Modelos e Ferramentas de Gestão Ambiental: desafios e perspectivas para as organizações. São Paulo: SENAC, 2006. P. 313 – 335.
- ii** IPCC – Intergovernmental Panel on Climate Change. Annex III: Glossary. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. Disponível em: http://www.climatechange2013.org/images/report/WG1AR5_AnnexIII_FINAL.pdf. Acesso em 07 jul 2014.

Beyond their capacity to amuse and entertain, the sheer magnitude of sporting and cultural events has the power to engage people, businesses, and government initiatives directed towards economic, social, and environmental opportunities. The connections between mega shows, international competitions, and major political or religious meetings and sustainable procurement – governmental and private – provide potential for the search for products and services consistent with solutions to the social and environmental dilemmas the planet faces. Based on “life cycle thinking”, the scenario presented in this book through didactic illustrations and technical references, inspires new paths in terms of the consumer choices made by public and private managers.

