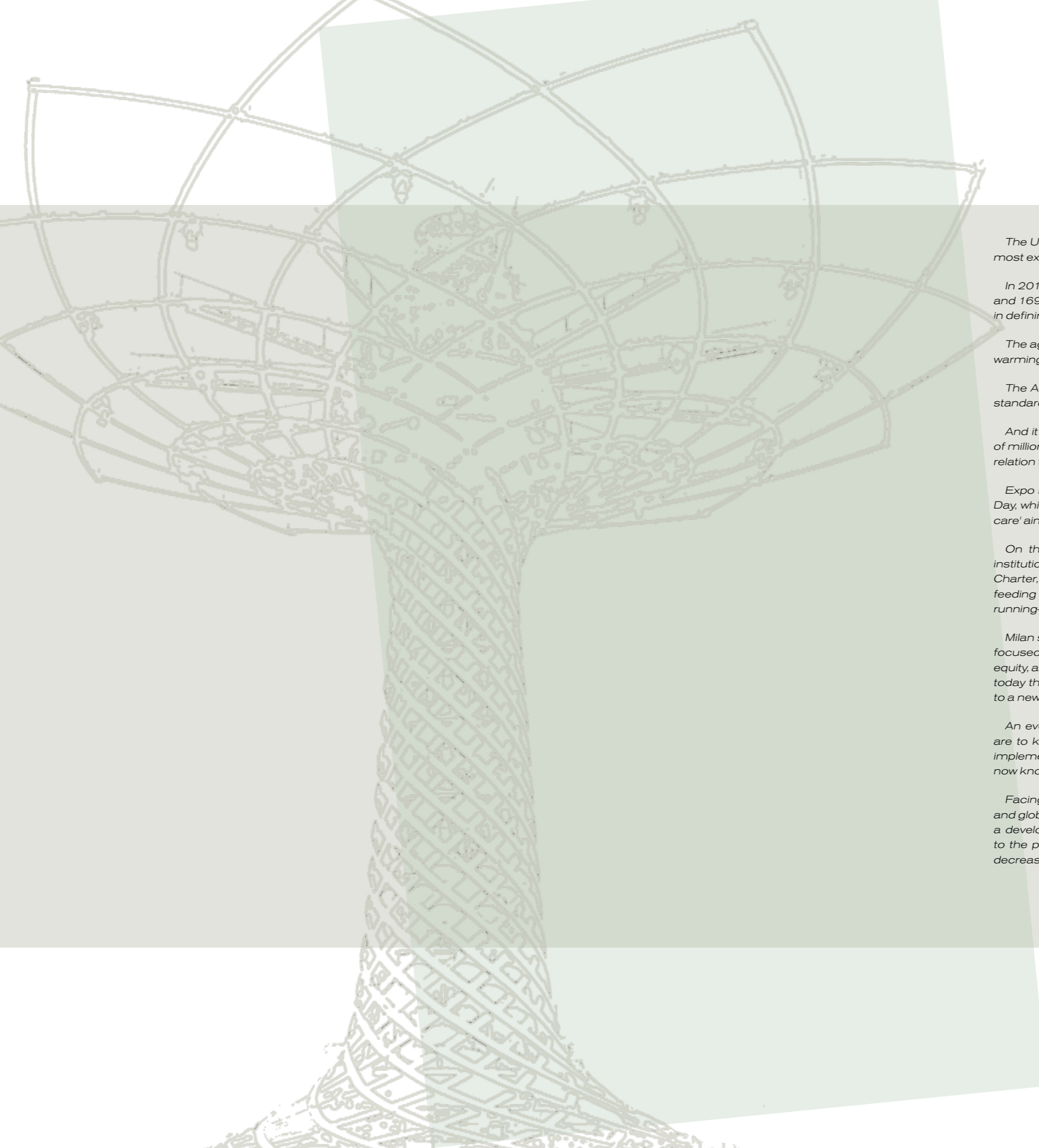




# THE EXPO WE LEARNED

The legacy of a mega-event  
in a circular economy  
perspective



*The Universal Exposition of Milan coincided with – and was at the same time an essential part of – the most extraordinary year for mobilisation around environmental themes.*

*In 2015, the United Nations adopted the 2030 Agenda for Sustainable Development; with its 17 goals and 169 targets it represents the opportunity to identify sustainable development as the main guidance in defining economic, social and environmental policies.*

*The agreement signed at Cop21 in Paris has stated the important shared commitment to limit global warming increase well below 2°C compared to pre-industrial levels and to drive efforts to limit it to 1.5°C.*

*The Addis Ababa Action Agenda was also adopted, aiming at linking financing tools to sustainability standards.*

*And it was again in 2015 that Pope Francis and his historic Laudato si' encyclical drew the attention of millions of people, be them worshippers or not, on the environmental challenges of our time and their relation to poverty and social justice.*

*Expo Milano 2015 gave us the opportunity to celebrate, together with UNEP, the World Environment Day, which delivered a global message on the theme 'Seven Billion dreams. One planet. Consume with care' aimed at creating a global community actively participating in environmental processes.*

*On the occasion of the Universal Exposition the whole world, through its representatives from institutions, research, sports, cooperation and communication, got together to draw up the Milan Charter, signed by over a million people and meant to face one of the greatest challenges for humanity: feeding an ever-growing population without damaging the environment, so as to preserve rapidly running-out resources for ourselves and future generations.*

*Milan set the starting point of an important concrete commitment, which we feel we need to carry on, focused on the fight against food waste, sustainable consumption models, social and intergenerational equity, all necessarily connected to a thorough reconsideration of the global economic model. Renewing today the legacy of this mega-event means being eager to keep giving our contribution along the path to a new era.*

*An ever-changing path which has become, at last, the centrepiece of the global agenda: the aims are to keep economic growth and carbon emissions apart, have a more efficient use of resources, implement renewables, put a focus on the conservation and consideration of soil, water, landscape. We now know that reaching such aims is not only possible but indispensable.*

*Facing the issue of mega-event sustainability means measuring up with this new economic model and global society, drifting away from the civilisation of wastefulness and consumption to move towards a development model built on recycling and regenerating. Circular economy, which is the paradigm to the present publication, is a necessary goal for our Countries, as it will ensure economic savings, decrease social and environmental costs, reduce inequalities, shape a fairer society.*

GIAN LUCA GALLETTI  
ITALIAN MINISTER FOR THE ENVIRONMENT



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# INTRODUCTION

Milan and Italy have had the unique opportunity to host a global event of extraordinary importance from an educational, cultural and scientific point of view. Expo Milano 2015 saw the participation of more than 200 participants, including countries, international organisations, institutions, NGOs and civil society representatives. It was experienced by more than 20 million visitors coming from all over the world. All of these actors had the opportunity to take part in a debate on the universal themes of food security and sustainable development.

Indeed, the Exposition of Milan was centred upon a reflection regarding the right to a healthy, secure and sufficient nutrition for the whole planet. Such theme is inextricably associated with the search for more sustainable production and consumption models, a challenge that is still currently the focus of the European and International agenda, part of the Europe 2020 Strategy<sup>1</sup> and the United Nation's 2030 Agenda.<sup>2</sup> Italy decided to take on this challenge to show that successful results for a more intelligent, sustainable and inclusive growth path can be achieved through experience, research, technology, innovation and participation.

The cooperation between the Italian Ministry for the Environment and Expo 2015 on the theme of sustainability started in 2013 with the signing of a three-year Collaboration Agreement (2013-2016) aimed at measuring the impacts generated by the organisation of the Exposition and identifying the related mitigation and neutralisation measures.

The main ambitious objective was the promotion of a strategy for the sustainability of mega-events which, starting with the case study of Expo Milano 2015, could then become a national and international point of reference for future mega-events.

Thanks to the support of Politecnico di Milano (Department of Energy), in agreement with the Ministry for the Environment, and IEFE - Bocconi (Centre for Energy and Environmental Economics and Policy), in agreement with Expo 2015, the Exposition of Milan became a field for defining and testing tools, indicators and initiatives, all aimed at minimising the environmental footprint of the event, thus becoming a beacon for sustainability practices. Such endeavour involved several actors who, thanks to their specific know-how, were able to contribute at different levels.<sup>3</sup>



<sup>1</sup> Europe 2020 is the 10-year strategy for growth and employment that the European Union launched in 2010. It contains five quantitative objectives to be reached by the end of 2020 related to employment, research and development, climate and energy, education, social integration and poverty reduction. [http://ec.europa.eu/europe2020/index\\_en.htm](http://ec.europa.eu/europe2020/index_en.htm)

<sup>2</sup> Transforming our World: The 2030 Agenda for Sustainable Development is the document adopted by the Heads of State on the occasion of the World Summit on Sustainable Development of 25-27 September 2015. It contains the commitments on sustainable developments that will have to be achieved by 2030, identifying 17 global objectives and 169 targets. <http://www.undp.org/content/undp/en/home/sdgoverview/>

<sup>3</sup> Amicucci Formazione; AzzerCO2; AMSA - Gruppo A2A; Bureau Veritas; Certquality; CONAI; DNV GL; Business Assurance Italia; Ecoact S.a.S; ER Creativi in prima linea; Ernst&Young Financial Business Advisor; FLA - Fondazione Lombardia per l'Ambiente; Fondazione Banca Alimentare; Fondazione Building Green Futures; Marco Gheri; Giulio Patrizi Designer; Icmq; Industria Scenica Cooperativa Sociale; Legambiente Lombardia; Manens-Tifs; Metropolitana Milanese; MWH; Greenwich; Mauro Patatini; RSE - Gruppo GSE; SAPM - Scuola Agraria del Parco di Monza; TREE.

**The Expo we learned. The legacy of a mega-event in a circular economy perspective** is the final product of such a long work on the strategy for mega-event sustainability, to which the Ministry for the Environment, Expo 2015, Politecnico and IEFE - Bocconi have all contributed.

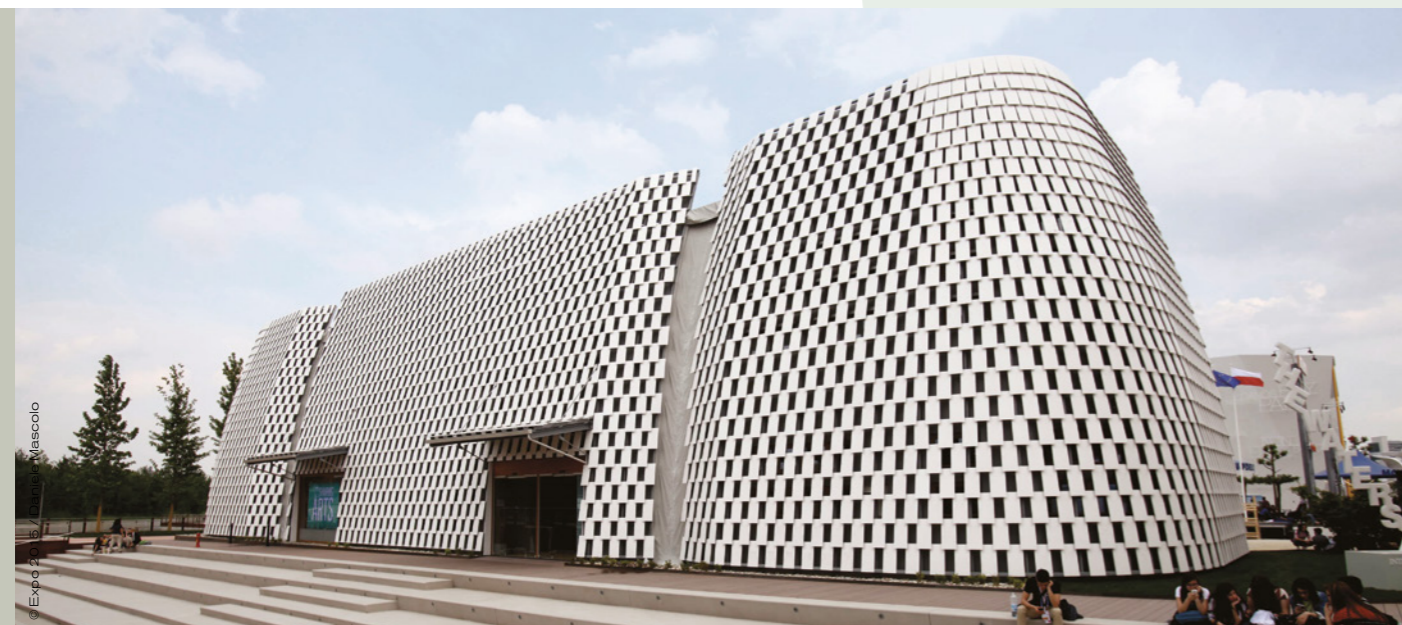
The authors of the current text, active in the project in various positions, have decided to share their work describing what has been produced and how, in order to make the acquired experience available to all stakeholders (institutions, partners, sponsors, participants), therefore helping future events, be them large or small, to perform better on sustainability.

This is not meant to be a comprehensive work including all the initiatives, reflections and actions carried out from May to October 2015 to get as close as possible to the objective. It is the partial though privileged point of view of the authors regarding some 'tiles' of sustainability, as developed on the special experimentation field of the complex reality related to the organisation, development and closing of a major Universal Exposition. Such different 'tiles' are based upon a sustainability-centred 'model' which takes into account the exhaustible nature of natural resources, aims at reducing waste products and fostering the reuse of materials, encourages change in the institutions, businesses and citizens' lifestyles and choices.

This target model is defined today as circular economy,<sup>4</sup> which consists in an approach overcoming the so-called 'linear'<sup>5</sup> economic scheme and affirming the necessity for modifications in product development, market models, methods to transform waste into resources.

The choice was therefore made to use such new paradigm as a lens through which to observe the 'Expo case'. The themes hereby identified and further explored place the current study in a framework that is both theoretical and practical, in order to analyse the opportunities and challenges related to the application of the sustainability strategy to a mega-event like a Universal Exposition.

The text consists of four chapters. Each of the first three covers a theme providing: a general overview of the topic being dealt with, the description of the approach adopted to shift from theory to practice and the results obtained. A list of 'lessons learned' features at the end of each chapter, containing the authors' recommendations for future reference. The last chapter is instead given up to sustainability cross-cutting themes. Through the whole text specific aspects and 'good practices' are dealt with in more detailed sections, clearly identified as coloured boxes.



More in details:

### Chapter one

'Buildings: temporary yet efficient' focuses on those buildings which represent one of the majority shares of the environmental impact of an event. In the present case, the choice was made to highlight the most relevant aspects concerning the sustainability of temporary structures - which are typical of events.

### Chapter two

'Purchase of goods and services: green is better' concerns the examination and application of Green Procurement criteria within the activity of goods and services procurement during the event. Green Public Procurement is a fundamental tool for the promotion of goods and services having a reduced overall environmental impact as measured under a life cycle point of view.

### Chapter three

'Waste: no more waste but new resources' describes the complex management of waste during the event, aiming at recycling and therefore at a strategic choice of materials - a topic that recalls and is linked to the themes covered in the previous chapters.

### Chapter four

'Cross-cutting initiatives for a more sustainable event' gathers all aspects that are related to the previous themes and cross the entire sustainability strategy applied to the Expo Milano 2015 case. Sustainability and CO<sub>2</sub> emissions<sup>6</sup> management as well as the criteria of the LEED Protocol are all included in this section. Special programmes developed and promoted by the Ministry for the Environment, namely *Towards a Sustainable Expo* and *Partake*, are also described in this chapter. The former started a 'virtuous competition' among Expo 2015 participants regarding voluntary initiatives and solutions for sustainability adopted in various fields, in order to foster those innovations and good practices that contributed to the sustainability of the event. The *Partake* project defined communication tools to involve, share and disseminate sustainability-related themes, as well as to guide the public towards more virtuous choices.



4 See focus on page 7.

5 The linear model for production and consumption is based on the following sequence: raw material extraction, processing, production, distribution, consumption and, at the end of the life cycle, disposal.

6 The main climate-altering gas emissions coming from human activities are CO<sub>2</sub> (carbon dioxide), CH<sub>4</sub> (methane), N<sub>2</sub>O (nitrous oxide) and fluorinated gases, mainly HFCs (hydrofluorocarbons), PFCs (perfluorocarbons), SF<sub>6</sub> (sulphur hexafluoride). Ozone (O<sub>3</sub>) and particulate matter have also recently been added to the list. These elements are responsible for the greenhouse effect, which means they retain part of the energy coming from the sun in the atmosphere. Such phenomenon is a natural one and contributes to make living on Earth possible, however an excess of greenhouse gas emissions coming from human activities is responsible for global warming.



KEYNOTES

The following definitions and key words will provide the reader with clarifications and guidance.

### The Universal Exposition

is the largest existing global event. Since its very beginnings in the first half of the 18th century it has represented a showcase for innovation and inspiration, presenting new models able to contribute to the development of civilisation. Universal Expositions (also 'Registered Universal Expositions') develop a general theme of common interest for mankind, happen every 5 years and last 6 months.

### Participants

are the actors of the Expositions, divided into Official Participants (countries and international organisations) and Unofficial Participants (NGOs, businesses, partners, civil society organisations).

### The BIE

Bureau International des Expositions is the intergovernmental body overseeing and regulating the organisation of Expositions through its General Assembly, that is the deliberative body made up of representatives from all Member States ([www.bie-paris.org](http://www.bie-paris.org)).

### Expo 2015 Spa

was created following the awarding of the Universal Exposition to the city of Milan. It is the company responsible for the creation of the exhibition site and the organisation and management of the event. *Also appearing in the text as: the Organising Company, Expo 2015*

### Expo Milano 2015

is the Universal Exposition that happened between 1 May and 31 October 2015, focused on the theme Feeding the Planet, Energy for Life. *Also appearing in the text as: the Event, Expo*

### The Theme

of an Exposition deals with global issues in a concerted way, shaping the event into an informative and educational tool as well as creating a space for reflection and international debate. The Theme of Expo Milano 2015, Feeding the Planet, Energy for Life, directed such reflection towards nutrition, meant first and foremost as human nutrition but also for the planet: the challenge consists in preserving the future availability of food resources through research and by sharing sustainable production and consumption models.

### The Exhibition Site

is the area specifically designed to host Expo Milano 2015, located north-west of Milan, bordering the Municipality of Rho territory. It covers an area of 110 hectares, on which permanent and temporary pavilions were built. The Organising Company built some permanent buildings, 8 clusters (grouping countries by thematic identities and food chains) and 4 thematic areas. *Also appearing in the text as: the Site*



EXPO MILANO 2015:  
THE PATH TOWARDS  
SUSTAINABILITY

The path towards sustainability of Expo Milano 2015 started in 2007, with Milan's candidature for hosting the Universal Exposition, and continued in 2010, with the Registration Dossier,<sup>7</sup> including precise commitments concerning sustainable development. Since the beginning, the sustainability of the Event became not only a strategic and operational objective, but also one of its very contents, relating to the Theme: *Feeding the Planet, Energy for Life*. Expo Milano 2015 therefore required a comprehensive and coordinated action in order to reach concrete sustainability goals, in line with national and European policies and guided by some principles and criteria:

- ✓ Prevention principle: environmental compatibility was integrated since the design stage.
- ✓ Planning and management: rules and guidelines on sustainability performance and environmental/energy requirements were implemented through management tools, with the final objective of leaving a tangible and intangible heritage after the Event.
- ✓ Involvement of stakeholders: an on-going and constructive, although informal, communication exchange with all the actors concerned played a fundamental role in the prevention of negative environmental and social impacts linked to the Event.
- ✓ Monitoring and reporting: the measurement of environmental, social and security performance was carried out through an effective set of monitoring indicators and tools, capable of analysing the effects of the Event, constantly controlling on-going activities and intervening when necessary.

The approach adopted was meant to cover the entire life cycle of the Event:

- ✓ planning and designing (approach phase);
- ✓ execution (management);
- ✓ closure and dismantling of the Exhibition Site.

<sup>7</sup> The document approved by the BIE Assembly in which the final project of Milan's Universal Exposition was described in detail.

Regarding the last point, it is important to add that all activities for reusing the Site do not apply to the scope of action by Expo 2015 but rather by Arexpo Spa, the company owning the areas and buildings thereon.

The action put in place by Expo 2015 also followed the current regional and national legal framework. In particular, the infrastructure plan borne by Expo 2015 for the creation of the Site was subjected to thorough verification, aimed at guaranteeing that works and activities were respectful of the resources and the territory concerned.

Two specific procedures were adopted:

- ✓ the Strategic Environmental Assessment (SEA) at municipality level for the change of use of the concerned area from mainly agricultural to mixed;
- ✓ the Environmental Impact Assessment (EIA) at regional level for infrastructural interventions as well as permanent and temporary construction.

Such procedures brought about a number of provisions affecting all phases of the project life cycle. The creation of an Expo 2015 Environmental Observatory was also provided for with the precise aim of following through the project and periodically verifying that provisions were respected.

Within such frame of reference, Expo 2015 developed the specific initiatives described in the following chapters. The developed strategy focuses on 3 main guidelines:

- ✓ circular economy, from the choice of materials to the prevention of waste production, from goods reuse to waste recycling;
- ✓ the management of climate-altering gas emissions, including actions to reduce energy demand, the inventory of emissions and their offsetting;
- ✓ certification as an action qualifying element, recognised by independent third parties, with the further objective of communicating the results obtained in a credible and transparent manner.



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Circular economy is the strategic approach the European Community has developed to ensure sustainable growth in Europe employing natural resources in a more sensible way. Such new approach aims at preserving and maintaining the value of products, materials and resources as long as possible, thus reducing waste production down to the minimum.

Until today the abundance of resources has allowed for the predominance of a model based on linearity (Figure 1).

The linear model of economic growth is no longer the most suitable for meeting the needs of modern societies and a globalized world: it has become evident that many natural resources are not unlimited, while the population growth and the economic development are requiring more and more goods and services and, consequently, a greater use of resources.

Giving up the old linear economy model to promote a 'circular' one is therefore essential, the latter being ideally aimed at reducing the introduction of 'primary extraction' resources in production cycles as much as possible and substituting them with materials recovered from the different phases of the original production cycle. In the ideal targeted model, a 'perfect circular economy' would be able to autoregenerate without it being necessary to input new resources from the outside (Figure 2).

In this way products and materials would keep their value as long as possible; the amount of waste and used resources would be minimised, and the resources would still be available in the economy, even at the end of the life cycle of a product, which would have been reused over and over to create further value.

In the current economic model, though, each phase of the production cycle generates scraps and waste, which are now recovered in a non-homogeneous way. The flow of material reintroduced in the production cycle is still significantly less relevant than the raw material input. The challenge is then to implement policies and actions that can reduce losing still useful materials and resources at each of the critical passage points from one production phase to the other as well as in the final phases, when collection is followed by waste recycling or disposal (Figure 3).

FOCUS  
CIRCULAR ECONOMY:  
THE NEW EUROPEAN  
PARADIGM

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Figure 1

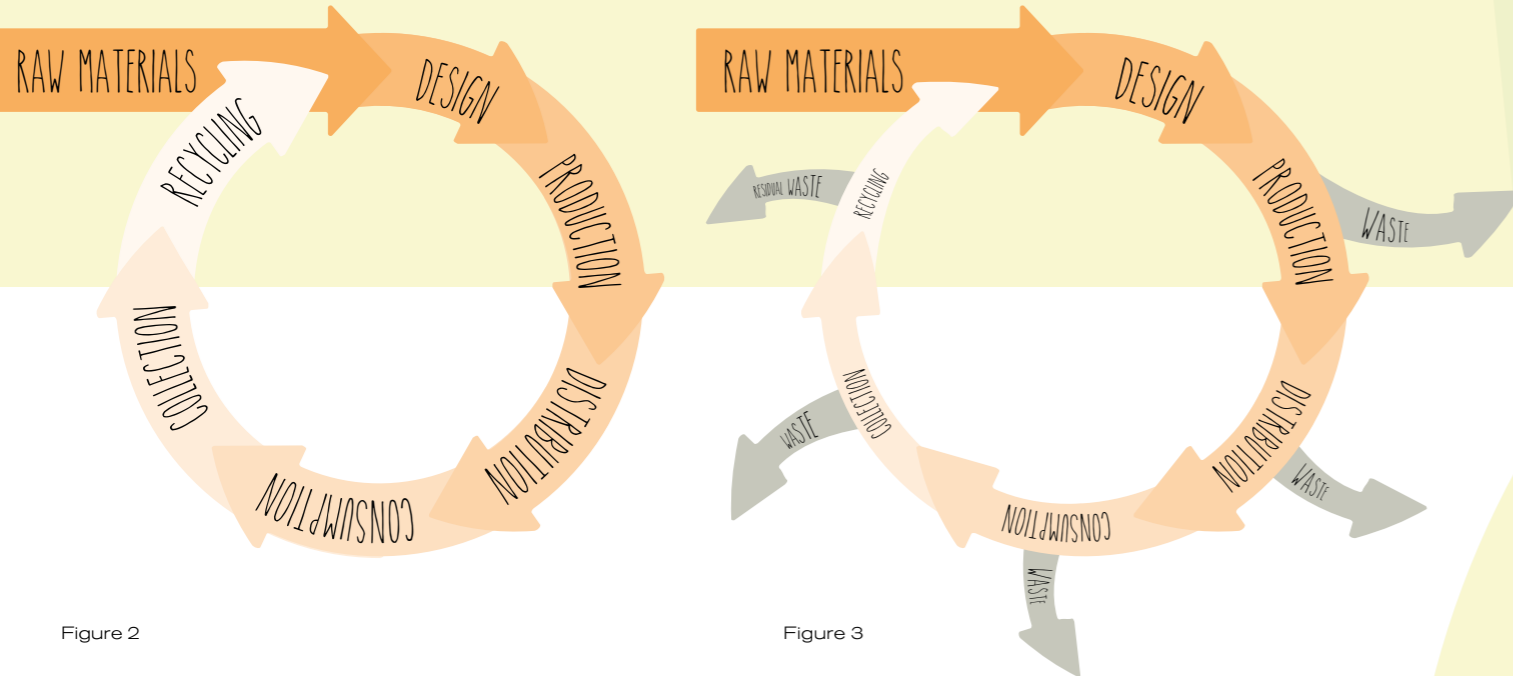


Figure 2

Figure 3

Source: Fabio Iraldo, Irene Bruschi, 'Economia circolare: principi guida e casi studio.'

The process of adopting the new model of economic development at European level has been sped up in the last few years, leading to the publication of the *Closing the Loop - An EU Action Plan for the Circular Economy Communication*,<sup>8</sup> adopted by the European Commission on 2 December 2015.

The Communication consists of a series of actions targeting all the phases in the product life cycle, including a better management of waste.

In that sense, the European Commission has also put forward a series of specific proposals to modify the legislation on waste management so as to increase recycling and reduce landfill occupation, proposing at the same time to remove all the obstacles that hamper improvements in waste management while considering the different individual situations of the Member States. The most significant provisions proposed concern:

- ✓ increasing the recycling target to **60%** of municipal waste by 2025 and to **65%** by 2030;
- ✓ a possible temporary waiver (5 years) for some countries with a current low level of selective waste collection;
- ✓ the recycling of packaging waste targeted at **75%**;
- ✓ minimising landfilling ( **10%** by 2030);
- ✓ unifying calculation criteria to ascertain the achievement of such objectives;
- ✓ the necessity of introducing organic waste sorting in the whole of Europe 'wherever it is technically, economically and environmentally feasible'.<sup>9</sup>

In circular economy systems products keep their value as long as possible in order to support sustainable growth. Extending the productive use of materials, reusing them and increasing their efficiency means reducing the environmental impact and production-generated emissions and, lastly, strengthening competitiveness within the frame of a shared system of rules. To this end, the general action plan sets provisions that serve 'to close the loop' in real economy and deals with all the phases of the product life cycle: from the extraction of raw materials to production, from transport to consumption, waste management and secondary raw materials marketing. The action plan also includes a number of measures aimed at overcoming the market barriers in specific sectors – plastics, food waste, critical raw material, construction and demolition, biomass and bio-based products among others. The efforts to enhance resource productivity go hand in hand with some other objectives of already existing European policies, such as the reduction of carbon emissions, a more efficient use of energy and raw materials, the sustainable reindustrialization of European economy.

The Italian government have already developed a tool to facilitate the transition to a more circular economy and the sustainable use of resources in accordance with European guidelines. The 'Collegato Ambientale'<sup>10</sup> (Environmental Annex) consists of a number of provisions about the remuneration of ecosystems and environmental services, waste management, reclamation, hydrographic districts and environmental damage. It also contains measures for the extension of minimum environmental criteria to all tenders, the provision of a national action plan on sustainable consumption and production, as well as a voluntary national framework for environmental quality.

Lastly, the Italian government have identified a number of qualifying factors to accelerate the process, such as:

- ✓ improving synergies and exchange of materials, resources and energy between public and private entities (for example through industrial symbiosis models);
- ✓ promoting the eco-innovation of products, processes and services, in particular innovative ecological design – the so-called 'eco-design' (for durability, recyclability, reparability, environmental and social sustainability);
- ✓ stimulating the market of sub-products quality and recycled materials also through a wider recourse to green public procurement;
- ✓ fostering more conscious sustainable choices by consumers;
- ✓ contributing to the environmental fiscal reformation;
- ✓ safeguarding and stimulating international competitiveness of Italian eco-efficient SMEs.

8 COM(2015) 614 final.

9 Proposed Directive of the European Parliament and of the Council amending Directive 2008/98 on waste. Art. 11 paragraph 2, letters c) and d).

10 Law 221/2015, so called 'Collegato Ambientale' and related to the Stability Law, has introduced several measures regarding green procurement, tax advantages for local authorities with high percentages of selective waste collection and the financing of businesses connected to the production, marketing and purchasing of products derived from post-consumption materials or from the recovery of scraps and materials left over from complex product disassembly.





BUILDINGS:  
TEMPORARY  
YET EFFICIENT

An important part of the impacts related to Expo Milano 2015 as a whole and other mega-events, such as the Olympic Games, pertains to permanent and temporary buildings, e.g. the pavilions.

Considering climate-altering gas emissions, the Expo 2015 inventory of emissions<sup>11</sup> shows that construction represents by far the most relevant cause for CO<sub>2</sub> emissions related to the Event.

In order to ensure the sustainability of a mega-event it is then essential to focus on the sustainability of buildings since the conception phase.

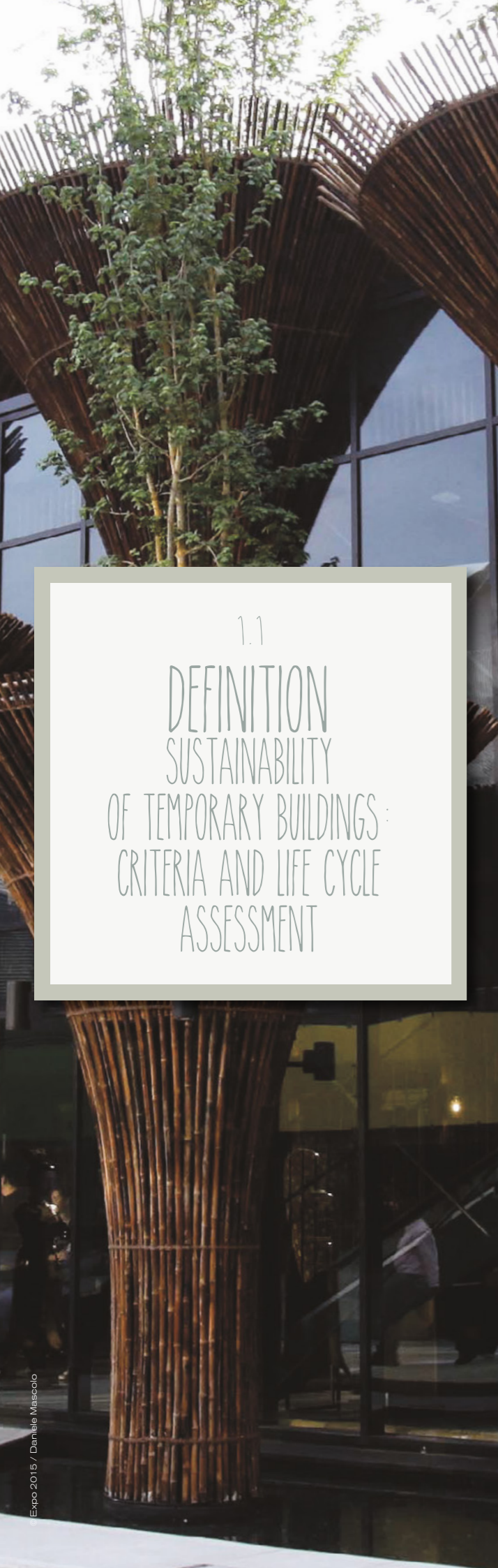
Design, therefore, must not be dealt with following a linear approach, but rather a cycle one, integrating the environmental criteria right from the conception stage. The objective is to make strategic choices that are aimed at containing the in-and-out flows of energy and materials for the building, making the designer responsible for all the stages of the building life cycle.

Analysing the issue of temporary buildings design and construction has led to the definition of three main strategies to interpret temporariness and to define the whole construction process: mobility, flexibility and reversibility.

Listed in the order given, as detailed in the following paragraph, these characterizing concepts define the level of temporariness of buildings, ranging from elements that bear very little variability to those designed to reach complete reversibility.



11 This is the 2012-14 inventory, certified by DNV-GL, which also contains the estimated emissions by Expo 2015 company in the years 2015 and 2016. The final inventory will be published in summer 2016. Because of the method applied and their lying outside the responsibility of Expo 2015, emissions generated for short and long-haul transport of visitors and building materials have not been included in the inventory. For a study on the methodology of the emissions generated by travel calculation, see the 'Methodological Focus on: travel'. The methodology is third party certified. The document is available on the website: [http://www.minambiente.it/sites/default/files/archivio/allegati/impronta\\_ambientale/approfondimento\\_metodologico\\_viaggi.pdf](http://www.minambiente.it/sites/default/files/archivio/allegati/impronta_ambientale/approfondimento_metodologico_viaggi.pdf)



1.1  
DEFINITION  
SUSTAINABILITY  
OF TEMPORARY BUILDINGS:  
CRITERIA AND LIFE CYCLE  
ASSESSMENT

### Mobility – Temporary location

Mobility concerns the variability in the environment-building relationship and refers to the mobile character of the building itself – its allowing for being transferred to different places.

Transport plays a fundamental role both in terms of impact and technological design. How the building is to be transferred must be set before actual action is taken; transport can take many different forms, each having their own limitations. Considering the dimensions and the shape is essential in planning handling and transport: a construction can be in the form of a 3D compact system (possibly expandable) or a building that can be disassembled and reassembled.

Containers, for example, are a well-known and widely spread three-dimensional system, used as single bodies or as aggregation of modules and sub-modules. Transport in their case is subject to strict regulations, but procedures improved and defined over time have made them easily movable and thus especially suitable for temporary construction.

### Flexibility – Temporary use

Flexibility is related to the purpose of the building, which can have different uses even for very short periods. This results in spatial and technological systems with layouts that can be more or less easily transformed. The necessary basis for a successful flexibility process is that the initial design of the main technical and technological elements must ensure that flexibility concepts can be put into practice.

### Reversibility – Temporary construction

Reversibility is closely tied to the timeline of the building use and the subsequent dismantling. The shorter the building life, the bigger the problem with building materials and components, too soon to become waste. The use phase, in relation to its short duration, has a very marginal role compared to construction, whose character depends on the building systems and technologies. In this sense, since reversibility refers to the capacity of building a system that can be unbuilt, it retains several advantages compared to conventional demolition. Reversibility also allows for taking on different challenges: from design to reuse/recycling, from creation to selective deconstruction. The most evident advantages of using technology intrinsically suitable for deconstruction (essentially based on mechanical connections) are:

- ✓ the potential reuse of building components or parts of them;
- ✓ easy material recycling compared to traditional systems;
- ✓ higher degree of sorted waste recycling and reduction of waste landfilling.

From the environmental point of view, deconstruction and reuse make it possible to preserve material embodied energy, thus reducing the input of new energy for reprocessing or regenerating the materials themselves. Other factors ensuing from the deconstruction process should be also taken into account, such as the significant reduction of space to be allocated in landfills.

From the economic point of view, dismantling a building typically requires more manpower and technical equipment than traditional demolition, so costs tend to be higher. Nevertheless, such costs can be compensated by the lower expenditure on recycling and disposal of materials, provided the dismantling is well planned.

### Design for deconstruction – Design for disassembly

There is a significant difference between deconstruction and disassembly, the latter being the process by which components are differentiated without being damaged –they are not necessarily meant to be reused; deconstruction is a similar process, but the focus is on reuse.<sup>12</sup>

The complexity of the design process makes it difficult to develop any deconstruction tool or guideline. Nevertheless, the designing process should account for the future demolition and disassembly of the building elements since the work conception and feasibility study, thus fostering the reduction of waste and the reuse of resources.

The standard performance model and the set of prescriptive guidelines grouped according to the specific life-cycle scenario should include:

- ✓ the building reuse or relocation (considering the distance between the original site and the new one as well as the impact of the transport of materials);
- ✓ reuse or relocation of components in a new building;
- ✓ reuse of materials for manufacturing new components;
- ✓ recycling of materials into new building materials.

Such a distinction also highlights the hierarchical nature of reuse, which is to be preferred to recycling from an environmental point of view. The strategy of component reuse usually requires much less processing energy and primary resources than reworking, which in turn demands less energy and materials than recycling.

It is necessary to consider the technological context in which the disposal will take place and also the aptitude of a building system or technological element to become separated taking up a minimum quantity of work and energy. It is therefore also evident how important it is to plan in advance the building life cycle and the reuse at the end of its first life, so as to correctly direct design choices.

The appropriate use of building technologies and their successful integration into the design process eases a greater reuse of building components in order to obtain a global improvement in the *Life Cycle Assessment (LCA)*<sup>13</sup> profile of any material/component (*Figure 4*).

<sup>12</sup> The topic was discussed at the 'Deconstruction - Closing the loop' conference held in 1999 at the Building Research Establishment (BRE).

<sup>13</sup> Life Cycle Assessment (LCA) refers to a method of measurement for calculating the ecological footprint of a product/service during its life cycle; it is based on an objective and precise process that assesses the environmental loads connected to the product/service taken into consideration by identifying and assessing the energy, the material used and the waste produced through the entire life cycle: from the extraction to the processing of raw materials, manufacturing, transport, distribution, use, reuse, recycle and final disposal.

**The end of life of Expo 2015 temporary structures: LCA environmental evaluation of three scenarios (extension of use on the site; relocation; demolition with recycling and reconstruction)**

The temporary nature of mega-events such as Expo 2015 calls for special attention on the management of temporary structures at the end of the event itself. Here above we have introduced the fundamental concepts for designing temporary structures aimed at containing their own environmental impact; with the present paragraph we wish now to proceed to an LCA to analyse the environmental impact related to the possible different scenarios at the end of life of Expo 2015 temporary structures (clusters, pavilions and facilities) so as to identify environmental improvement potentials.

The location of Expo Milano 2015 structures for the purpose of the Universal Exposition is to be seen as limited to the Event's six months, at the end of which it is necessary to understand what should become of the different structures. Among the preliminary indications the Organizing Company had arranged for specific warnings in this respect: 'The Participants are bound to design and realize temporary and sustainable buildings, following designing criteria oriented to low environmental impact and with a view to the life cycle of materials and components'. The temporary nature of mega-event buildings can be seen as:

- ✓ temporary function (refunctionalisation and reuse of the building in the same site at the end of the event);
- ✓ temporary location (disassembly at the end of the event, reassembly of the entire structure and reuse of the building in a new location);
- ✓ temporary life (demolition at the end of the event and landfilling or recycle of materials).

The three scenarios (Figure 9) obviously bear different implications from the environmental and economic point of view. The demolition-recycle scenario is the most likely to occur if the project was not originally meant for reuse. The reuse scenarios are a possible alternative, as shown by previous experiences. An example of reuse with relocation of the structure elsewhere is the Christ Pavilion, used for Expo 2000 in Hannover and relocated to Volkenroda, where it has become a religious facility for the local community. Examples of reuse are the *Olympic Village* of Turin, used for the Winter Olympics of 2006 and reconverted into social housing, the *Performing Art Centre*, used at Expo 2010 in Shanghai and reconverted into the *Mercedes-Benz Arena* (a facility for concerts and cultural, sports and entertainment events), and London's *Olympic Stadium*, used for the Olympic Games of 2012 and readapted as the West Ham United football team stadium.

In order to carry out the comparative LCAs of the three end-of-life scenarios it has been necessary to define the methodological guidelines for assessing temporary buildings,<sup>14</sup> subjected to third parties. A 10-year scenario has been defined as the reference time span for the LCA study; in the case of a temporary building to be demolished at the end of the event, the necessity of building a new structure to be used until the end of the defined ten-year period has been supposed.

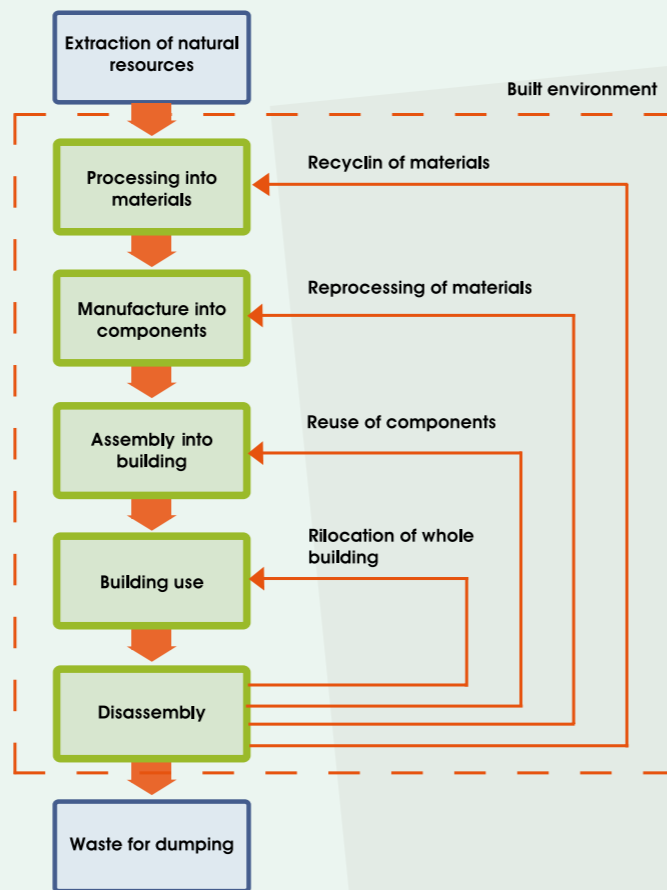


Figure 4. Life cycle of the building. Source: Marco Imperadori, 'Temporary buildings: case studies and technologies' in Politecnico di Milano - Department of Energy, 'Guidelines for the reduction of the environmental impact of temporary building and structures in mega events'

As a consequence, the end-of-event scenarios assessed are:

- ✓ extension of the building use (reuse in the same location), integrating materials for the new use (Figure 5);
- ✓ disassembly of the building at the end of the event, transport (40 km by truck) and relocation (reuse at another location), integrating materials related to the new use and the foundations reconstruction (Figure 6);
- ✓ demolition at the end of the event, landfilling or material recycling and reconstruction of a new building for the 'second use' (Figure 7).

The results refer to an LCA applied to Expo Milano 2015's clusters. In particular the assessment has been carried out for the *Isole Mare e Cibo* (Islands, Sea and Food) cluster, since all the clusters had the same structural frame and only building envelopes changed.<sup>15</sup>

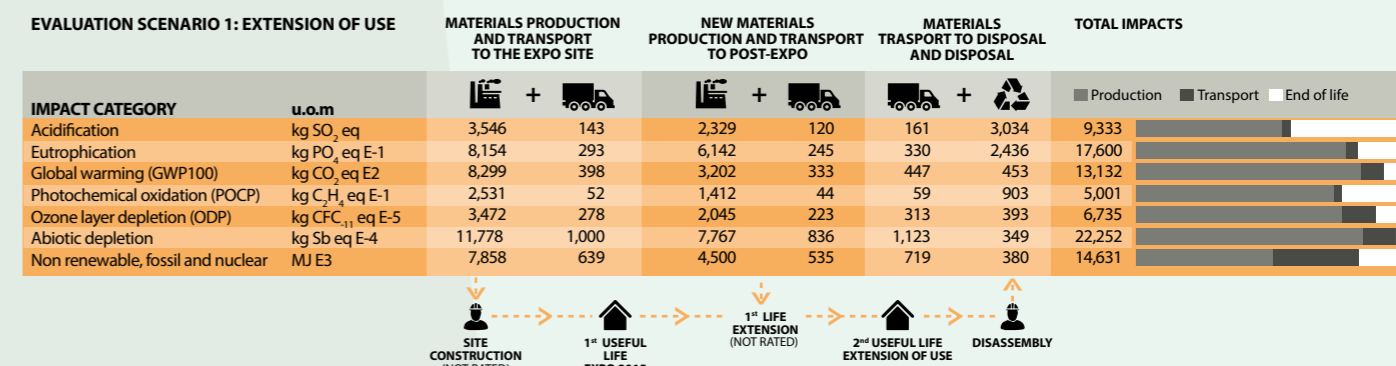


Figure 5. LCA environmental impacts of end-of-life scenario No. 1 (extension of use on the site).

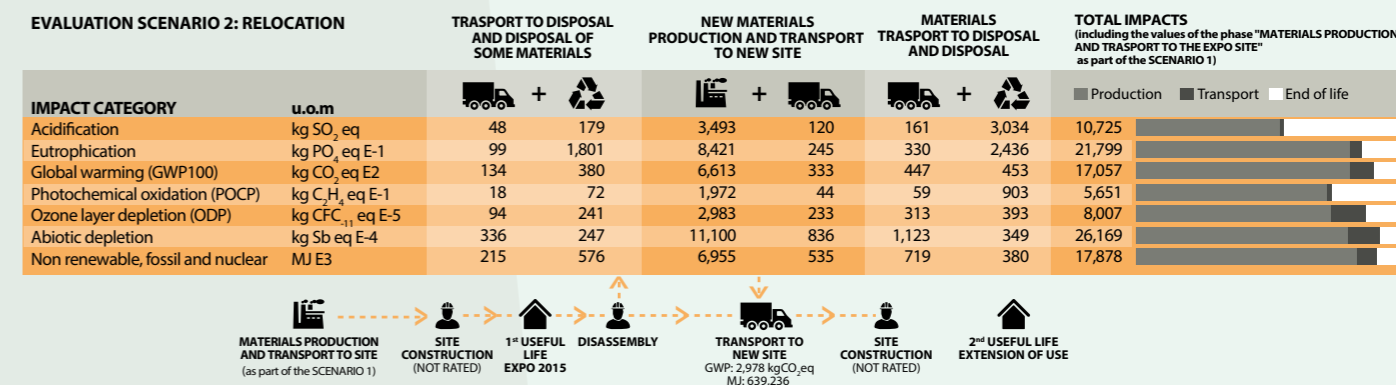


Figure 6. LCA environmental impacts of end-of-life scenario No. 2 (relocation).

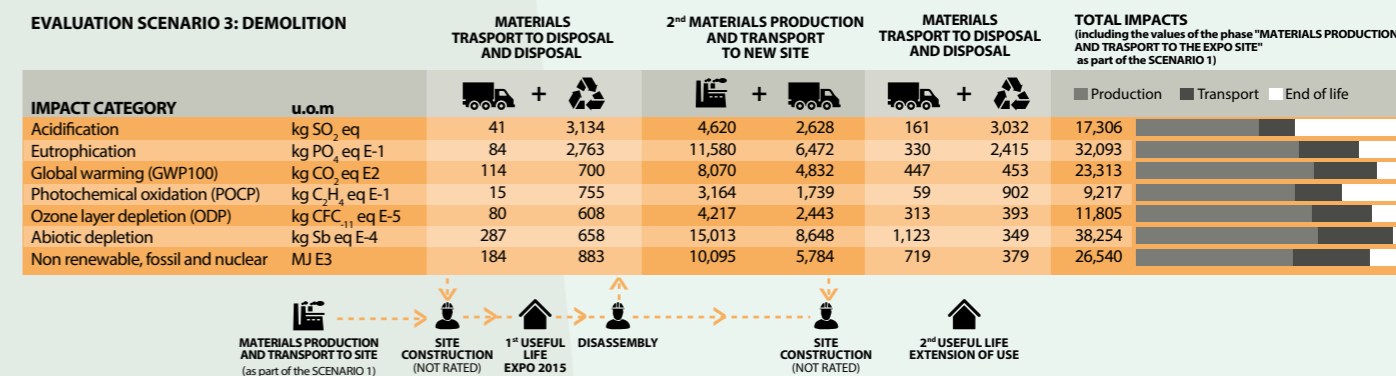


Figure 7. LCA environmental impacts of end-of-life scenario No. 3 (demolition and reconstruction).

Source: Andrea Campioli, Monica Lavagna, Sara Ganassali, Michele Paleari, 'LCA methodology for temporary buildings' and 'LCA evaluation of the Expo 2015 Clusters' in Politecnico di Milano - Department of Energy, 'Guidelines for the reduction of the environmental impact of temporary building and structures in mega events'.

<sup>15</sup> Further results are to be found in Andrea Campioli, Monica Lavagna, Sara Ganassali, Michele Paleari, 'LCA methodology for temporary buildings' and 'LCA evaluation of the Expo 2015 Clusters' in Politecnico di Milano - Department of Energy, 'Guidelines for the reduction of the environmental impact of temporary building and structures in mega events' and available online at: [http://www.minambiente.it/sites/default/files/archivio/allegati/impronta\\_ambientale/2\\_Guidelines\\_reduction\\_impact%20\\_%20mega%20\\_events\\_expo.compressed.pdf](http://www.minambiente.it/sites/default/files/archivio/allegati/impronta_ambientale/2_Guidelines_reduction_impact%20_%20mega%20_events_expo.compressed.pdf)

The use phase has not been included in the LCAs since the impacts are exactly the same for the three scenarios, which differ only as far as the end of life is concerned. The end-of-life impacts (after 10 years) have been taken into account as related to landfilling or recycling at the end of the second use.

The comparison between the LCA results (Figure 8) has pointed out that the solution with a smaller impact is the refunctionalisation on the site, while relocating involves a slight increase of the impacts related to transport and construction of irreversible foundations (impacts for the disposal of foundation materials and the production of new materials). Relocation is then a reuse scenario whose environmental profile varies considerably depending on the distance from the new site.

Demolition and reconstruction is the scenario with the biggest impact, notwithstanding prevailing material recycling has been hypothesised. That is because the reworking of recycled materials is necessary anyway to realize new products, which is responsible for an increase in the overall impacts.

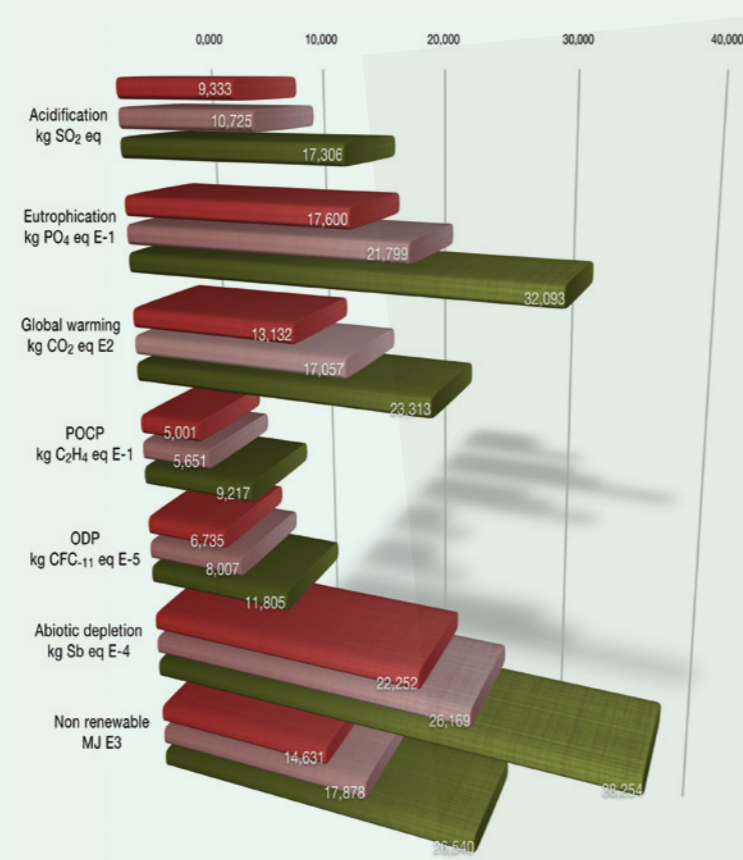


Figure 8. Comparison of the LCA impacts of the three end-of-life scenarios (Nos. 1, 2 and 3). Source: Andrea Campioli, Monica Lavagna, Sara Ganassali, Michele Paleari, 'LCA methodology for temporary buildings' and 'LCA evaluation of the Expo 2015 Clusters' in Politecnico di Milano - Department of Energy, 'Guidelines for the reduction of the environmental impact of temporary building and structures in mega events'.

In order to verify the influence of both the building solution and the building dimension, further verification has been carried out considering three small-size temporary pavilions as models, implying three different technical solutions.<sup>16</sup>

Three representative models have been defined with the same spatial configuration but different construction solutions: the first model is characterized by a reinforced concrete grade-beam foundation and an elevation structure made of X-lam<sup>17</sup> structural wood panels; the second model has a reinforced concrete grade-slab foundation and a glue laminated timber framework elevation structure; the third model is characterized by a reversible foundation solution made of steel self-anchoring poles and a steel elevation structure.

Here the foundation role comes up again (Figure 10), further emphasized by the small dimensions of the model pavilions (30x15x5 m). The foundations affect the relocation scenario significantly (Figure 11), except for the case of the reversible self-anchoring poles of the steel structure. While the environmental impacts of the reuse-on-the-site scenario are half the impacts of the demolition and reconstruction scenario, the relocation scenario appears significantly influenced by the related impacts to transport and foundations, so much so that in the case of the wooden framework with slab foundation solution the environmental advantage amounts only to 10% compared to demolition and reconstruction.

Such evaluations make it evident that the results from LCAs are significantly impacted by the specific characteristics of the project (meaning that the results herewith described can't be applied to different situations) and show how they can become a useful tool in guiding end-of-life management choices in the direction of more conscious environment consideration.

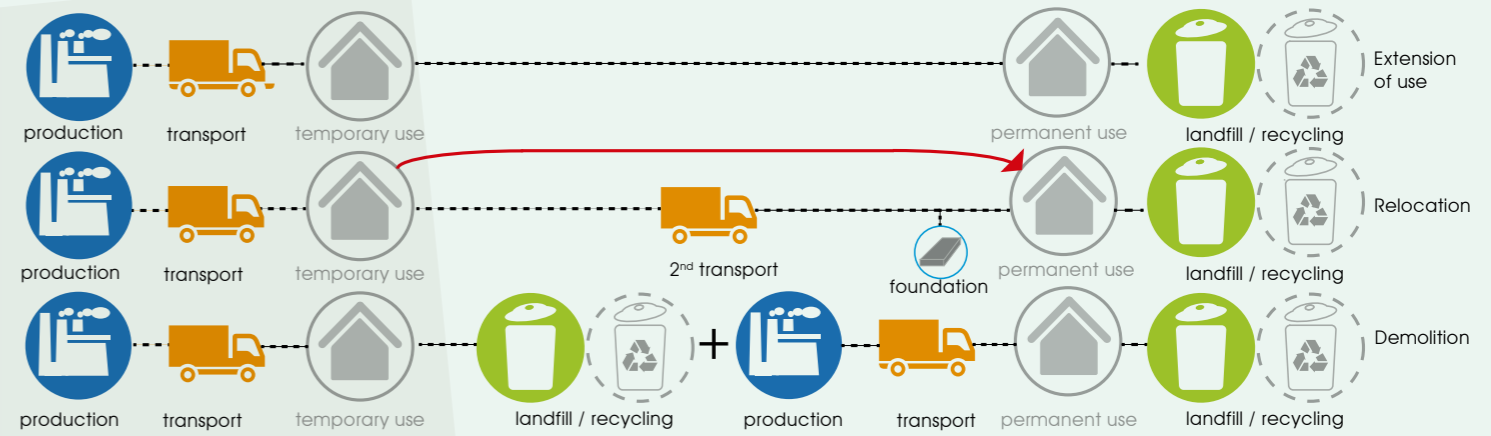


Figure 9. Chart of the three end-of-event scenarios taken into account.

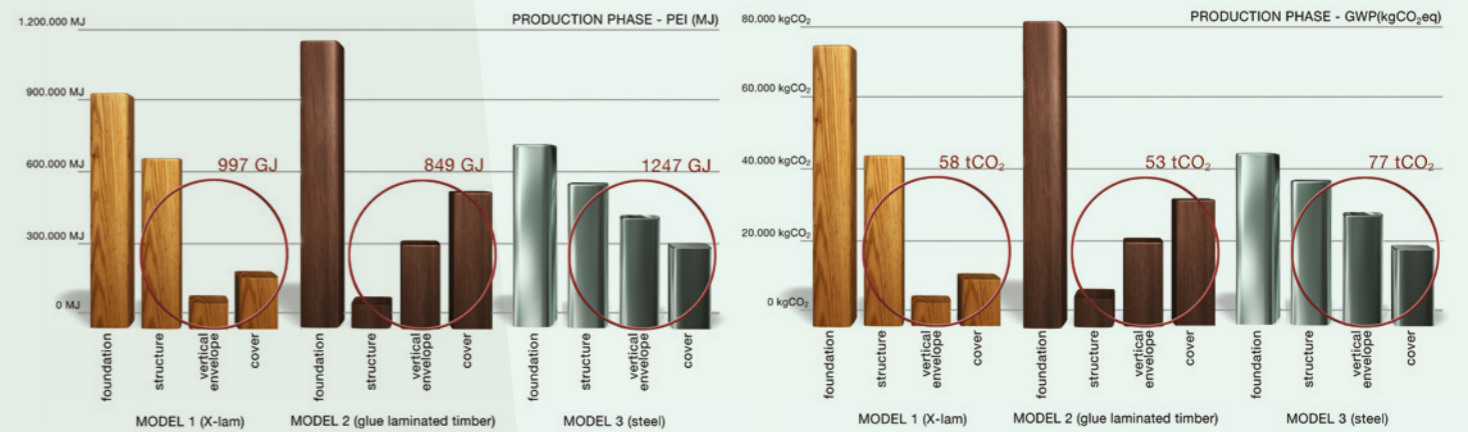


Figure 10. Comparison between the LCA impacts of the three models (the overall impacts, foundations excluded, are circled).

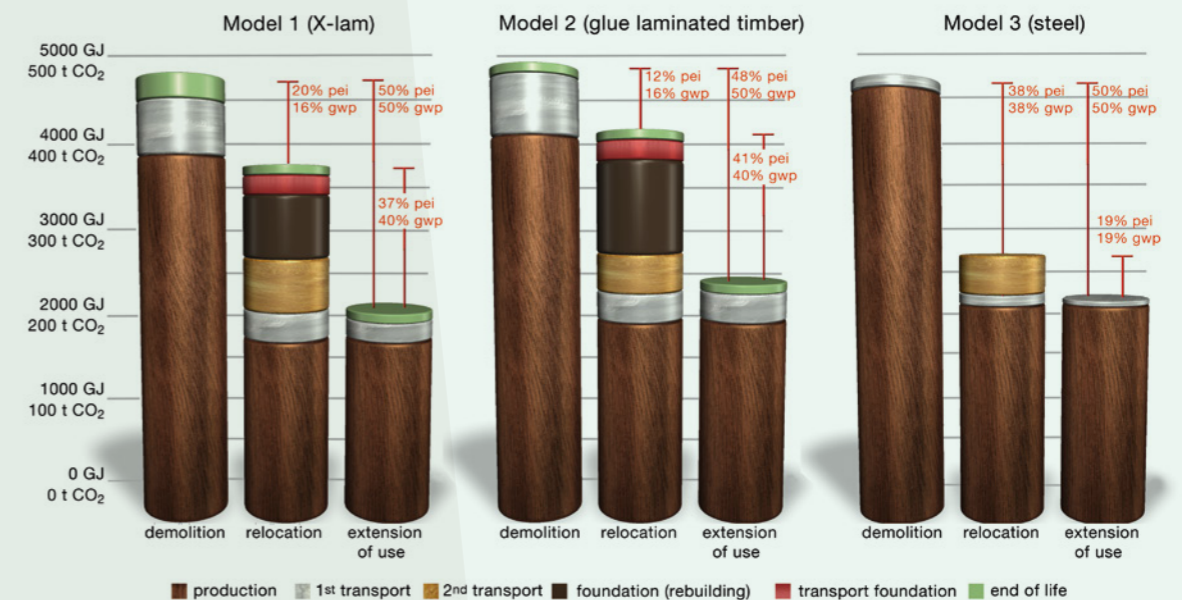
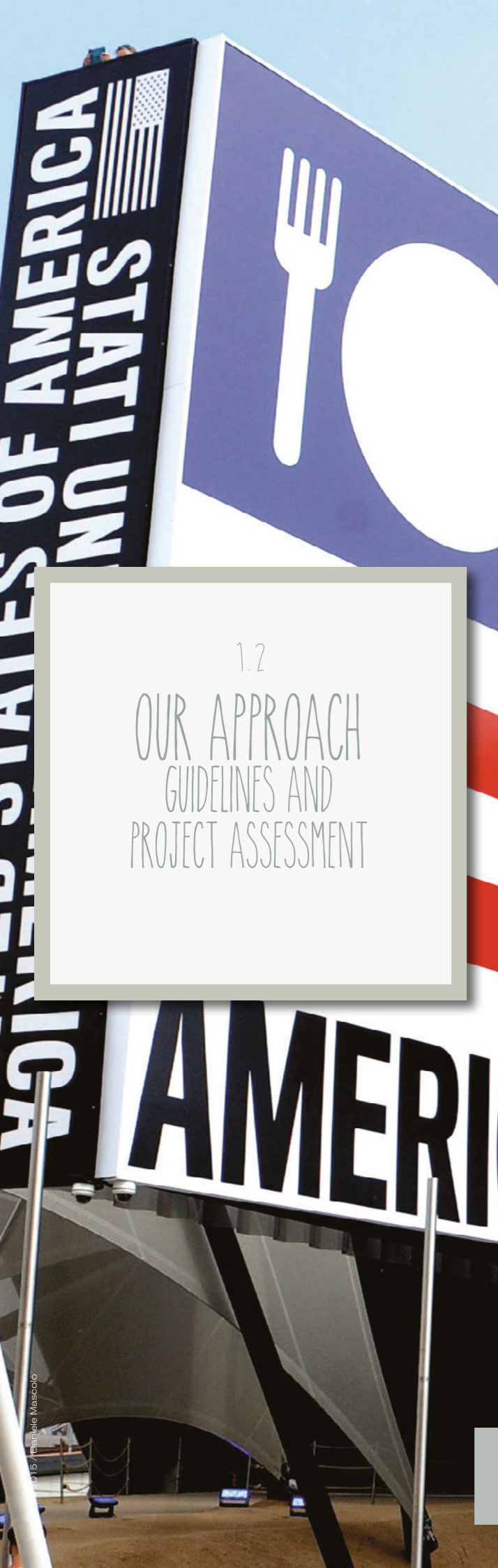


Figure 11. Comparison between the LCA impacts of the three end-of-life scenarios for each of the three models.

Source: Monica Lavagna, Giovanni Dotelli, Alberto Prinzo, Francesca Gussago, 'LCA methodology for temporary buildings' and 'LCA of representative models of temporary structures for mega events' in Politecnico di Milano - Department of Energy, 'Guidelines for the reduction of the environmental impact of temporary building and structures in mega events'.

<sup>16</sup> Monica Lavagna, Giovanni Dotelli, Alberto Prinzo, Francesca Gussago, 'LCA methodology for temporary buildings' and 'LCA of representative models of temporary structures for mega events' in Politecnico di Milano - Department of Energy, 'Guidelines for the reduction of the environmental impact of temporary building and structures in mega events', available on line [http://www.minambiente.it/sites/default/files/archivio/allegati/impronta\\_ambientale/2\\_Guidelines\\_reduction\\_impact%20\\_%20mega%20\\_events\\_expo.compressed.pdf](http://www.minambiente.it/sites/default/files/archivio/allegati/impronta_ambientale/2_Guidelines_reduction_impact%20_%20mega%20_events_expo.compressed.pdf).

<sup>17</sup> Cross laminated wood panels with supporting function in eco-friendly wood buildings construction.



1.2  
OUR APPROACH  
GUIDELINES AND  
PROJECT ASSESSMENT

The principles and criteria for a higher degree of sustainability in mega-events must be integrated into all the phases of the event's life cycle by using policy and specific management tools for each actor involved.

Such principles inspired Expo 2015 to create three sets of Guidelines<sup>18</sup> for the design phase in order to regulate the construction of exhibition spaces (pavilions or self-built spaces), namely the temporary structures put up by the Participants on each parcel of the Exhibition Site; basically, instructions defining specific environmental requirements and suggesting the sustainability criteria that could be applied according to the different design choices. All the Guidelines were published on a shared platform and made available to the Participants and to the public, too.<sup>19</sup>

The first set of guidelines, *Self-Built Exhibition Space Guide - Design, Construction, Set-up and Dismantling (SBES)*, and the second, *Self-Built Technical Requirements (SBTR)*, issued at the beginning of 2013, contained precise specifications to be adopted in order to minimise energy and natural resources consumption. At the beginning of 2013 Expo 2015 also drew up *Guidelines - Sustainable Solutions - Design, Construction, Dismantling and Reuse*, a communication aimed at promoting the adoption of additional green criteria. The latter document, conceived as complementary to SBES and SBTR, was articulated according to the three phases that are considered relevant to assess the overall environmental impact of buildings: design, construction, dismantling and possible reuse (or material recycling / disposal). For each phase the impacts of the most relevant environmental components were taken into account and the relevant sustainability objectives were defined; an overview of Milan's microclimate was also provided so that it could be taken into consideration when designing temporary buildings to be used over the period of the Event (May-October).

Considering the three sets of guidelines as parts of a single system of tools for pavilion designing it is possible to obtain from them the general objectives and more precise indications on construction aspects.

18 Expo 2015 also later created the Dismantling Management Guidelines to regulate the Site post-event dismantling phase.  
19 <http://www.expo2015.org/archive/en/learn-more/sustainability.html>

## SUSTAINABILITY OBJECTIVES FOR TEMPORARY BUILDINGS AT EXPO MILANO 2015

- ✓ Minimising energy demand for cooling
- ✓ Minimising energy demand for indoor lighting
- ✓ Maximising energy efficiency
- ✓ Maximising the use of renewable
- ✓ Minimising water consumption and waste production
- ✓ Preventing environmental impacts on soil and air quality
- ✓ Minimising the heat island effect

Table 1

## MAIN INDICATIONS (ALSO PRESCRIPTIVE) FOR TEMPORARY BUILDINGS AT EXPO MILANO 2015

- ✓ Dimensions: building maximum height: 12-17 m
- ✓ Planimetric development in relation to the parcel: minimum 30% as green or open area
- ✓ Maximum power supply set for each pavilion type in relation to the dimension of the allocated parcel and integration of the energy needed with renewable from 242 to about 900 kW
- ✓ Minimum 50% of green roofing
- ✓ Recycled material use for pavilion construction (foundations included): 50% or more of the overall weight of construction materials
- ✓ Minimising water consumption and rainwater harvesting for irrigation and sanitary use
- ✓ Particularly high levels of Solar Reflectance Index (SRI) of roofing and open-air areas in order to contain the 'heat island' effect: SRI > 30 % for outdoor areas and SRI > 80% for roofing

Table 2

The designing activity of the self-built pavilions carried out by the Participants was articulated in two separate phases: development of a *Preliminary Design* and a *Detailed Design*, differently detailed. At the preliminary stage the sustainability strategies were only generally defined, while in the second phase the Participants were invited to present contents in depth, providing designing details and developing the original general statements for the project into detailed environmental sustainability commitments by making precise reference to the implemented technologies with adequate documentary support.<sup>20</sup>

20 It is worth noting that the contents of the Preliminary and Detailed Design are only partially comparable with the contents provided for by the Italian law. The Participants were not requested many of the elements characterizing the project final stage as per D.lgs 163/2006.

Expo 2015 supported the Participants analysing the project documentation they had prepared, answering any doubt and providing all necessary clarifications, helping them attain full compliance with the Italian law provisions and voluntarily implement the sustainability criteria. The latter objective in particular received the collaboration of the Italian Ministry for the Environment who, through the Politecnico di Milano (Department of Energy), was able to provide indications on the projects in order to:

- ✓ direct designers towards adopting solutions aimed at meeting the sustainability goals as defined in the above mentioned Guidelines, with special reference to resources and energy consumption as part of the life cycle concept;
- ✓ ease the implementation of a coherent and strong approach to the sustainability of the project, asking the designers to clearly express and argue the connections between the design solutions and the environmental sustainability objectives;
- ✓ make it easier for evaluators to verify the consistency between the objectives declared and the project solutions chosen.

On the basis of the considerations on quality aimed at reducing the environmental impact of buildings considering their whole life cycle, and in accordance with the Guidelines contents, the following key points were identified as particularly relevant when verifying the sustainability of buildings:

- ✓ the end of life of the buildings (disposal/recycle/reuse);
- ✓ the content of recycled material inside construction material (in particular for those materials that, because of their weight and specific impact, contribute most to environmental emissions and resources consumption);
- ✓ the reduction of consumption for cooling (since the Event took place from May to October), which can be attained by:
  - adopting passive strategies to reduce direct sun radiation (screens for glass portions, reflection and inertia characteristics for opaque closing sections); such parameters can indeed result in a significant reduction of solar heat gains while ensuring, if correctly designed, the natural light supply;
  - systems for free cooling, ventilation control, partialisation, control of the quantity of latent heat (this is an important point, considering the presence of many visitors and cooking activities);
  - last, efficient active cooling (performance of the system components, output of the air-conditioning machines, recovery of heat from fridges for sanitary hot water production).

Other relatively less relevant aspects were also taken into consideration: the use of renewables to cover the energy supply needed beyond the quantity provided by the organisation, highly energy-efficient lighting, water consumption reduction.



The framework of the adopted solutions can be traced thanks to the analysis carried out in two different phases.

The first was performed at the design stage, when the preliminary designs for 74 pavilions<sup>21</sup> (>90% of the temporary buildings constructed) were examined and suggestions were made on how to increase sustainability; the relevant final designs were also analysed to ascertain if the suggested solutions had been implemented.

The second analysis concerned 33 pavilions that were actually built on the Universal Exposition site and whose Participants took part in the *Towards a Sustainable Expo* programme in the Buildings category.

In analysing the projects, the same 6 criteria were used, later to be adopted as benchmarks in defining the *Towards a Sustainable Expo* programme.<sup>22</sup>

#### Efficient cooling: minimising electricity consumption by reducing energy demand through passive solutions

The air-conditioning of pavilions accounted for a relevant share of the energy consumption at Expo Milano 2015. In order to face such an issue, since the design phase a lot of pavilions provided for technological solutions to minimise cooling. 63 pavilions (as many as 85% of the ones which were analysed at the design stage) proposed solutions that would mitigate solar heat gain at the level of the building envelope, introducing, for example, shading and screening devices, ventilated façades, phase-change materials (PCM<sup>23</sup>). Among good practices the following are worth mentioning: Azerbaijan used a wall shading system reducing direct solar heat gain though allowing controlled sunlight penetration; New Holland Agriculture opted for glass surfaces with a low solar factor and external screenings, with the insertion of photovoltaic panels in some parts.

<sup>21</sup> Three were not actually built because the relevant countries (Latvia, Nigeria and Sri Lanka) renounced to having their own pavilions or preferred to relocate into a cluster.

<sup>22</sup> For further details on the Programme see chapter 4, page 74.

<sup>23</sup> When heated, these materials change phase and store thermal energy, then releasing it gradually when the outside temperature decreases. They are used in construction to increase the inertia of the building, diminishing the incoming thermal wave. In the case of Expo they contributed to mitigating heat peaks during the hours with direct sun radiation.

In 48 pavilions (65% of the projects analysed) the solutions proposed involved free cooling or natural ventilation; among good practices is China's wide bamboo roofing with openings at the top to induce ventilation produced by chimney effect. It is to be mentioned that 5 pavilions minimised the use of mechanical cooling solutions by essentially doing without any air-conditioning system. Austria realised a pavilion with an internal wood as a major feature that, apart from fulfilling an aesthetic function, would contribute to shading and adiabatic cooling: it was a particularly successful solution, entailing a reduction in inside temperature by 5°C.<sup>24</sup> In the French pavilion the exhibition space on the ground floor was completely open on the sides and naturally ventilated. Caritas' pavilion was designed to ensure thermal comfort through shading and adiabatic cooling, while Save the Children<sup>25</sup> chose for its pavilion natural ventilation and shading. Last, Coca-Cola had a closed pavilion without any active cooling system: energy efficiency and comfort were ensured by the smart use of screenings and special construction materials for the four façades (one of which was water cooled).

Bahrain, for its part, implemented a special exhibition solution by designing its pavilion as an outdoor shaded itinerary with a soft coloured setting across ten orchards representative of the country: such a choice made it possible to gain a sensible advantage in energy saving, as an air-conditioning system was not necessary.



Another solution adopted by some 30 pavilions (more than 40% of the analysed ones) was green roofing on at least a portion of the building roof – more than 13,000 m<sup>2</sup> of green roofing were done in total. Among good practices some stand out: Belarus, Coca-Cola, Kazakhstan, United Arab Emirates, New Holland Agriculture, Russia, France, Save the Children, Monaco all had more than 50% of green roofing. Monaco's green roofing, in particular, had both an environmental significance and a tie with the theme of Expo Milano 2015: its set-up allowed for the cultivation of a vegetable garden with Mediterranean varieties.<sup>26</sup> Lastly, Israel's solution is worth mentioning: although no green roofing was realised, the pavilion stood out for its original vertical farming wall, where the country's typical crops were on show, supported by an efficient drip irrigation system.

As far as the Solar Reflectance Index (SRI) of roofs and open areas is concerned, 26 pavilions (35% of the analysed ones) allowed for roofing materials with such SRI values as to reduce the heat island effect. Such values, in accordance with the indications by Expo 2015, varied according to the accessibility or non-accessibility of the roof to people: in the former case, in order to prevent people's dazzling, RSI values were equal to 30, in the latter they were equal to 80. Some other pavilions presented more than 70% green roofing, which couldn't but have positive effects on the heat island control. As for outdoor areas, 17 pavilions provided for the use of materials with SRI equal to 30.

#### Recycled (or certified) materials for the pavilions: using recycled or certified materials for pavilion construction

Among the pavilions that chose wood, USA, Russia, Vanke and KIP International School declared they had used recycled wood at least for parts of their structures. More than 30 structures, pavilions and clusters employed wood coming from certified and verified supply chains guaranteeing that the material was sourced from forests managed in a fair, responsible and sustainable way.<sup>27</sup> According to the PEFC Italia association almost 32,000 m<sup>2</sup> of wood certified by them were used for the Event.

#### Energy from renewables: meeting part of the energy demand through the installation of renewable energy sources

Another recommendation by Expo 2015 was to meet part of the energy demand through the installation of renewable energy sources: according to available data, some 10 pavilions installed photovoltaic solar panels for a total of about 2,250 m<sup>2</sup> and a power of around 300 kWp. Among good practices are the solutions implemented by Austria, Azerbaijan and Brazil, who essentially devoted their whole roofs to photovoltaic production (respectively about 390 m<sup>2</sup>, 225 m<sup>2</sup> and 350 m<sup>2</sup>). Austria also installed a photovoltaic prototype capable of absorbing both sun and moon light. The Belgian pavilion, for its part, resorted to the use of renewables by means of traditional panels, innovative photovoltaic systems and a heat pump; a mini wind turbine was also installed for demonstration purposes.



#### Lighting: minimising electricity consumption by reducing energy demand through more efficient electrical systems

Expo 2015 declared that in the six months of the Universal Exposition's lifespan the 47 GWh of used electricity were 100% green, that is generated by certified sources of renewable energy.

As many as 66 pavilions (89% of the analysed one) allowed for the installation of LED lighting systems;<sup>28</sup> some of these pavilions also implemented occupancy sensors and BMSs (Building Management Systems) to monitor and control lighting systems and other building features so as to reduce consumption. Furthermore, an automatic supervision system for controlling and managing electricity loads was implemented in 14 pavilions.

24 See good practice on page 28.

25 See good practice on page 31.

26 See good practice on page 30.

27 The two main standards are FSC - Forest Stewardship Council and PEFC - Programme for Endorsement of Forest Certification schemes.

28 LED lighting is considered particularly efficient and durable, the Light Emitting Diode being a passive electronic component.

## Water consumption: saving on a precious resource

During an event such as Expo, water consumption is to be accounted mainly to sanitary uses, installations, catering (for the preparation of meals and crockery washing) and the irrigation system for the green areas. Expo 2015 suggested to implement technological solutions to reduce water consumption by up to 50% compared to traditional systems. As many as 55 pavilions (74% of the analysed ones) allowed for implementing water saving technologies (in particular dual-flush and low-flush toilets). The tanks for the harvesting of rainwater, to be reused for non-food purposes, constituted another important solution for saving on the water needed for installations: among the pavilions which adopted them a special mention goes to New Holland Agriculture, who used the harvested rainwater for the irrigation of the huge sloping green roof covering its exhibition space, and to Belgium, who installed a tank for water harvesting equipped with a phytopurification system.

## Pavilion reuse: reusing the pavilions or recycling materials

What would happen with the pavilions at the end of Expo Milano 2015 was, as already argued, a crucial point for reducing the impacts of this temporary mega-event. Because of the uncertain new purpose of the area it is not clear yet how many structures will be reused on the site (possibly a dozen). Many of these will anyway need some work, essentially for winter air-conditioning, as they were built as temporary constructions to be used in the summer months. 18 pavilions are currently being dismantled to be moved and reused elsewhere; for most of them a second life had already been identified at the design stage, and many were conceived for dry assembly in order to be more easily reused. Their new intended uses are very diverse: Angola is taking its pavilion home to convert it into a museum on the country's participation in Universal Expositions; Bahrain will make a botanical garden out of it to be located in the centre of the capital city; Azerbaijan's pavilion will become the Museum of Biodiversity at Baku's botanical garden. Other pavilions will be donated to charities: Monaco has planned to allocate it to Burkina Faso to be reused as a facility for Red Cross personnel training projects; Don Bosco's pavilion will become a school in Hungary; Save the Children will move its structure to Somalia to serve as an extension to an already existing hospital set up by another NGO. A last case to be mentioned is Coca-Cola's pavilion, which was designed since the beginning to be converted, after the Universal Exposition, into an indoor basketball court to be installed in one of Milan's public parks. As already pointed out in the paragraph about the LCAs of temporary structures, the distance between the first temporary location of the building and its final location is a relevant element in considering its environmental impact. Therefore, if the aim is reducing the environmental impact of the structures, it is crucial to favour locations which are as close as possible to the original temporary ones and pay special attention to the environmental impact of transport.

For some other pavilions no reuse had been planned, but it has been possible anyway to recover part of the building materials to be reused or recycled. As of today it has been possible to retrace the partial reuse of wood courtesy of Mauro Saviola Group, the company in charge of dismantling 12 structures (as of the end of March 2016): about 3,300 tons<sup>29</sup> have been recovered to be reintroduced in production processes.



## Plan post-event action

Since the very conception of the event the utmost attention is to be paid to the topic of post-event reuse of the area and related structures in order to be able to plan the subsequent phase. The perspective to be adopted is a special one: the event is not the main focus for the creation of the area infrastructure, but rather the temporary guest of a site that has a much longer life perspective than the event itself.

## Take the whole life cycle into account

While evaluating the sustainability of the structures involved, the whole life cycle of the buildings is to be taken into account, following the LCA methodology and including all the required steps: material production; construction; use during the event; dismantling and reuse; recycling or disposal of materials.

## Foster reuse

Whenever temporary buildings are involved, structures that are easy to adapt or disassemble are to be favoured, so that they can later be reused for other purposes or alternatively on other premises, possibly close to the event's location. This way, the reestablishment of the previous functions of the hosting site will also be ensured.

## Develop policies on the sustainability of buildings

A policy on the sustainability of the buildings conceived to host the event is to be adopted well in advance of construction, therefore enabling to steer the design of structures into a green direction.

## Include guidelines for the sustainability of buildings

Guidelines on the sustainability of buildings with clear indications of compulsory architectural criteria are to be drawn up, including reference standards and provisions on the main aspects involved in the construction: building size; planimetric development to minimise soil use; use of recycled and recyclable materials; employment of technologies aimed at maximising energy efficiency, reducing the heat island effect and limiting water consumption; installation of plants based on renewables. The climate conditions of the location are also to be taken into account when selecting the materials as well as the architectural and energy solutions.



### Reward sustainability

Incentive mechanisms for the most sustainable and cutting-edge technology solutions are to be put in place since the conception stage, while also taking financial feasibility into account.

### Start operating at the design stage

During the various design phases (preliminary, final and executive) the respect of the measures contained in the guidelines is to be verified; by elaborating precise indications on how to improve the performance of buildings and adopt even more sustainable solutions it is possible to guide the design phase, therefore obtaining immediate improvements that can be then adopted during construction.

### Monitor strategies and performance

Monitoring actions on the environmental strategies implemented by the actors involved are to be carried out in order to verify their effectiveness. A system to collect data related to the performance of buildings during their life cycle has to be put in place, including for example energy consumption, energy supply from renewables, water consumption, quantity of recycled or certified materials.

### Disseminate the legacy

Good sustainability practices that have been carried out are to be collected and disseminated, for example through guided tours for both insiders and the public during the event.



GOOD PRACTICES

# AUSTRIA



The concept of the Austrian pavilion at Expo Milan 2015, designed by team.breathe.austria,<sup>a</sup> focused on the most important nutritional element for both humans and the Planet: 'Air as Food'.

The peculiarity of the Austrian pavilion, distinguishing it from all others, was the planting of a wood in the central, outdoor part of the lot, around which the exhibition was structured. The wood covered 48% of the exhibition area, reflecting the actual configuration of the country itself, since Austria is covered by a similar percentage of forest. The types of trees and vegetation were also chosen to represent the different climate zones of Austria.

Furthermore, the wood constituted a natural production plant providing oxygen for an equivalent of about 1,800 visitors per hour. It also served as natural cooler, enabling the pavilion to maintain an inside temperature about 5°C lower than the outdoors.

The vision on which the design lay was the choice of nature, rather than technology, as the protagonist: technology enhanced the value of nature, not vice versa. For this reason, at the conception stage the use of multimedia installations was discarded and an 'analogic' exhibition itinerary favoured, with the further objective of reducing energy consumption. Information was drawn upon the wooden walls. The pavilion welcomed people to its wood, from which the visit started, showing Austria's engagement for sustainability and displaying proposals to extend to other (not only) public buildings the philosophy at the base of the pavilion: giving nature a central role.

Austria participated in the *Towards a Sustainable Expo* programme for the category of sustainable architecture, in which it was one of the leaders.



The main architectural and technological solutions concerning sustainability were the following:

- ✓ the prevalence of open spaces, starting with the wood, and limitation of enclosed spaces to service areas and few offices;
- ✓ a cooling system exploiting the cool air 'produced' by the wood, diverted to the indoor area through a piping system;
- ✓ a major photovoltaic system installed on the roof, one of the largest at Expo 2015 with 400 m<sup>2</sup> and a declared power of 46 kWp;
- ✓ the installation of a prototype photovoltaic structure absorbing both solar and lunar light;
- ✓ energy-efficient spot lights on the roof, artistically simulating moonlight at night;
- ✓ the use of mono-materials to facilitate their reuse;
- ✓ the use of wood coming from certified and controlled supply chains;
- ✓ the use of a home-automation system to remotely control water management, lighting, the ventilation and nebulisation systems;
- ✓ the installation of LED lamps.

It was provided for that at the end of the disassembling of the pavilion the trees would be moved to be donated and replanted at a mountain-themed museum.



MONACO



Monaco's pavilion<sup>a</sup>, designed by architect Enrico Pollini, caught the eye of visitors from an architectural point of view, especially because of the idea to use shipping containers for the main structure.

The choice of using containers, besides standing out for its originality, also met sustainability needs. Indeed, not only were the containers – which conceptually represented trade and exchange – reused at the end of Expo 2015, but they had also been originally selected among those that had gotten to their 'last journey': they were reused instead of becoming waste to be disposed of. The two side walls made of containers were covered by a green roof reminding of a sail, a sloping tent.

Besides containers, certified softwood with guaranteed controls all along the supply chain was the other material employed, always with a view to sustainability.

The following are some of the sustainability elements to be remembered:

- ✓ the green roof covering, realised with a special moss able to retain humidity, therefore allowing the growth of a lush Mediterranean vegetation on the roof during the whole duration of the Universal Exposition;
- ✓ the lightweight structure of the building, not burdening the ground and making use of removable and recyclable plinths;
- ✓ the orientation of the pavilion, allowing to maximise the exploitation of natural light;
- ✓ the lighting coming from LED lamps, programmable and adjustable according to the natural light coming in through the large windows.

Another key element was the strategy to reuse the structure: its second life was planned in detail since the conception phase. It was provided for that the pavilion would be transferred to Burkina Faso to be reused as a facility for Red Cross personnel training projects, becoming the focal point of a series of buildings that would host activities and courses. Although the intended use of some parts will change, the structure will be fully reused with the exception of a few elements, including the green roof due to the different climate and contextual characteristics of the country that will permanently host the building.

Thanks to all of the above-mentioned sustainability elements, Monaco's pavilion was one of the leader participants in the architectural category of the *Towards a Sustainable Expo* programme, although it was also present in two other categories, namely green procurement for furniture, packaging, merchandising products and other sustainable initiatives.

The exhibition inside the pavilion focused on three main themes. Cooperation, with various examples of projects developed to help some other countries to reach the UN's eight *Millennium Development Goals*<sup>b</sup>; governance, supporting businesses that develop innovations in the food sector and in safeguarding protected marine areas; education, putting forward captivating and dynamic educational policies on sustainability-related themes, especially in relation to the sea and fishing.

<sup>a</sup> For more information: <http://monacopavilion.com/>

<sup>b</sup> The Millennium Development Goals have been put forward by the United Nations and include fight against poverty, support to education, fostering of gender equality, reduction of mother and child mortality rates, fight against HIV and other illnesses, support to environmental sustainability, promotion of a global partnership for development. Info at <http://www.un.org/millenniumgoals/>



Save the Children®



Save the Children<sup>a</sup> participated in Expo 2015 with a pavilion designed by the group *Argot ou La Maison Mobile*<sup>a</sup>, who decided to depict an 'experiential village' made mainly out of wood. The NGO aimed at raising awareness on child malnutrition, the main cause of the mortality of children between 0 and 5 years of age. The choice was made to create an emotional visit itinerary that, through interactive, digital and analogic installations as well as sensory experiences, invited people to 'twin up' with one of the beneficiary children of the organisation's initiatives, following them in the everyday life of their village and including all daily difficulties involved in the search for food.

The structure was conceived as an open space, easy to access, with outdoor gardens and cultivated areas recalling the experience of community fruit and vegetable gardens. Simple materials such as wood, bamboo and metal sheets were selected; furthermore, the flooring was made up by an alternation of concrete and earth, once again to recall the colours of faraway lands.

The concept of the pavilion included some important sustainable solutions such as:

- ✓ the absence of mechanical systems for cooling/heating (except for a small office room) thanks to the openness of the pavilion allowing natural ventilation, which led to energy savings;
- ✓ the presence of a green roof covering the pavilion;
- ✓ the prevalent use of wood coming from certified and controlled supply chains for the main structural elements such as roof, pillars, beams, coverage;
- ✓ the installation of a 'demonstrative' photovoltaic system producing about 1kWp and supplying the perimeter lights;
- ✓ the installation of a tank for rainwater harvesting and an irrigation system that measured soil humidity and regulated its own use based on actual needs;
- ✓ the use of LED lamps and other technological solutions to reduce energy consumption.

Since the designing phase, Save the Children also conceived its pavilion so that it could easily be disassembled after Expo 2015 and reused as the expansion of an existing hospital built by a Turin-based NGO in Somaliland.

Thanks to the above-mentioned characteristics, the pavilion of Save the Children was among the leaders in the category of sustainable architecture of the *Towards a Sustainable Expo* programme.

<sup>a</sup> <http://www.aoumm.com/>

<sup>b</sup> For more information: <http://expo.savethechildren.it/>



2  
PURCHASE OF GOODS  
AND SERVICES:  
GREEN IS BETTER

Green Procurement (GP) may be defined as the process whereby organisations seek to procure goods and services with a reduced environmental impact throughout their whole life cycle when compared to goods and services with the same primary function.

Green Public Procurement (GPP) has already been long promoted and encouraged in public procurement-related strategies and policies both at the national and European levels, acknowledging its potential as a key tool to foster a more sustainable use of natural resources and behavioural changes for more sustainable production and consumption.<sup>30</sup>

Today, the *Europe 2020 Strategy* and the *European Union's Action Plan for the Circular Economy*<sup>31</sup> (the latter was issued at the end of 2015) give GPP a prominent role among the tools fostering a transition towards a more circular, low-carbon and resource-efficient economy.<sup>32</sup> Public procurement makes up for a considerable share of European expenses (almost 20% of the EU's GDP) and can therefore have a fundamental role in such transition. Within the Plan, the Commission will elaborate new GPP criteria and review the existing ones from a circular economy point of view, focusing on aspects like durability and reparability of goods; it will promote further dissemination of GPP among public authorities, also through specific training programmes and by setting a good example with its own tenders and EU funding.

Several studies<sup>33</sup> aimed at detecting the products with the greatest environmental impact over their whole life cycle have identified the food & beverage industry as one of the main causes of private consumption-related environmental impacts. Among these studies one was commissioned by the European Commission in 2012<sup>34</sup> with the objective of evaluating the environmental impact of the food sector in its different phases: it confirmed its association with a high-level of consumption of industry-related resources and highlighted the importance of a change in people's consumption models in order to reduce the related environmental impacts.



30 Since the end of the 1990s and the publication of the Green Paper Public procurement in the European Union: Exploring the way forward (1996) the European Commission has progressively widened its attention on the GPP tool. Since 2003 the Commission has recognized GPP as a key tool of the Integrated Product Policy within the relevant Communication (COM 2003/302), which invited Member States to implement national action plans on GPP to provide it with the widest possible dissemination.

31 COM(2015) 614, final.

32 Commission's Communication EUROPE 2020, A strategy for smart, sustainable and inclusive growth, Brussels, 3.3.2010, COM(2010) 2020, final.

33 See for example: FAO (2015), Natural Capital Impacts in Agriculture – Supporting Better Business Decision-making; Environmental Impacts of Products (EIPRO, 2006), Analysis of the life cycle environmental impacts related to the final consumption of the EU-25; DE-FRA (2006), Environmental Impacts of Food Production and Consumption. In particular, EIPRO's study points out three main sectors as responsible for environmental impact: food & beverage production, transports and the private residential sector. Overall, these sectors make up for between 70 and 80% of the environmental impact relating to private consumption and for about 60% of the related expenses. In particular, the food & beverage industry causes between 20 and 30% of the various environmental impacts related to private consumption and is furthermore responsible for over 50% of eutrophication.

34 Assessment of resource efficiency in the food cycle, Final report, European Commission (DG ENVIRONMENT), December 2012.

## 2.1 DEFINITION GREEN PROCUREMENT AND MEGA-EVENTS

Within such a context, the use of Green Procurement as a tool for the organisation of a mega-event such as the Universal Exposition offers the unique opportunity to significantly foster innovation and the development of eco-friendlier products and services, as well as to direct the market towards more sustainable solutions. Indeed, the organisation of the Exposition requires a well-structured supply system in order to meet the considerable demand for materials, goods and services. In particular, at Expo Milano 2015 the fundamental search for more sustainable production and consumption models related to the Event's theme *Feeding the Planet, Energy for Life* further encouraged the adoption of tools that could foster a cooperative attitude among all the actors involved in the organisation and management of the Event, in order to work for common objectives in favour of the environment and sustainability.

Through the inclusion of environment-focused criteria in purchasing and supply procedures, the event organisers have the opportunity to involve, raise awareness and promote sustainable attitudes not only among their suppliers, but also among the various economic partners from the 'Expo system' and, more broadly, all the actors involved in the event in various ways. Among them, the Participant Countries – 138 at Expo Milano 2015 – were key in adopting environmental criteria for supplies, since each country had to define and develop its own supply system for the organisation of its participation in the Event, in terms of both necessary goods for the construction and set-up of the exhibition space – pavilion and indoor space – and for the provision of services within the space itself, first and foremost catering.

At the same time, the considerable number of stakeholders, the wide variety of the supplies needed, the management of the relations with a large number of entities, the common legislative framework<sup>35</sup> defined for the Event and the organisation time-related issues all contribute to making the context for the application of an effective green procurement system particularly complicated. In this sense, the greatest challenge for Expo Milano 2015 in relation to procurement sustainability was precisely the management of the complexity of the context of application of a green procurement system aimed at seizing and further promoting the upcoming opportunities.

<sup>35</sup> With specific reference to the legal nature of Expo 2015 SpA as a body governed by public law, which therefore operated as contracting entity through public tendering procedures for works, supplies and services in compliance with Legislative Decree No. 163 of 12 April 2006 (Public Procurement Code).

## 2.2 OUR APPROACH COMMITMENT AND TOOLS IN ACTION

The commitment to adopt a more sustainable procurement system for the Exposition dates back to the time of the city's candidature. In the *Candidature Dossier*<sup>36</sup> the commitment to adopt a *Green Procurement Programme* in compliance with EU and national GPP-related policies and guidelines had already been formalised, aiming at guiding the purchasing choices of partners, sponsors, suppliers and, more broadly, the whole 'Expo system' towards the use of eco-friendly materials; the objective was to minimise the environmental impact of the products to be employed and marketed.

At the stage of the Event's organisation, such commitments were concretely fulfilled along two main lines of activity:

- ✓ on the one hand, there was an effort to ensure that the purchasing choices of public company Expo 2015 SpA were inspired by green criteria, whenever possible and in compliance with the regulations on public procurement;
- ✓ on the other, a series of initiatives were implemented to disseminate good practices on green procurement as broadly as possible, involving all the company's main interlocutors – Participating Countries, partners, sponsors, suppliers etc. – both on a voluntary and contractual basis.

In both cases, the *Green Procurement Guidelines* played a fundamental role; drawn up as early as 2013, these guidelines were meant to encourage and guide the Universal Exposition's Participants in the integration of green criteria in their procurement process for all necessary goods and services related to their participation in the Event.

### Green Procurement Guidelines

First of all, in order to develop the *Green Procurement Guidelines* the main European and Italian legislative references to green procurement were taken into account:

- ✓ the *EU GPP Criteria*;
- ✓ the *Environmental Minimum Requirements (Criteri Ambientali Minimi, CAM)* adopted by the Italian Ministry for the Environment as regards specific product categories considered to be more relevant in public procurement;
- ✓ the EU Ecolabel scheme (Reg. No 66/2010/EC) and the criteria for issuing the related label.

<sup>36</sup> The *Candidature Dossier* was submitted by the Comune di Milano (Municipality of Milan) to the Bureau International des Expositions (BIE) in 2007.

Secondly, the following were examined:

- ✓ methodological references to existing guidelines and standards (e.g. ISO 20121<sup>37</sup> on sustainable event management) and existing documents derived from previous experience in the organisation of mega-events, inasmuch as they may concern the theme of procurement sustainability (e.g. London 2012's *Olympic Games Packaging Guidelines*);
- ✓ literature references to the topic, in particular studies on the sustainability of supply chains and food distribution methods, LCAs related to the food industry or materials for set-ups and furnishings etc.

Such an in-depth analysis brought to the definition of the *Guidelines* scope, selecting five main product categories that were relevant in the Event's organisation for supporting the integration of environmental criteria in the procurement activities of Expo Milano 2015's Participants:

### Food & Beverage

Expo Milano 2015 has been the first Universal Exposition dedicated to food sustainability, and, in fact, almost all Participants offered some kind of catering activity during the semester. Therefore, the category 'Food & Beverage' had to be among the most significant ones.

### Furniture

Most participants took part in the Event by setting up an exhibition area on the Site: in some cases this was prefabricated and provided by the Expo company, in others it was planned and built independently. Such areas obviously needed arrangements for furnishings, technical equipment and set-ups.

### Merchandising

Since an Exposition represents a unique occasion, most Countries and an even greater number of partners and sponsors were expected to create *ad hoc* merchandising products for the Event.

### Packaging

All categories of products here above listed require specific packaging, which accounts for the decision to introduce environmental criteria focused on primary, secondary and tertiary packaging.<sup>38</sup>

### Event organisation

All Universal Expositions are characterised by a multitude of events organised within and outside the Exhibition Site for the duration of the event: conferences, seminars, tastings, concerts, exhibitions etc. It was therefore strategically important to identify guidelines to minimise the environmental impact linked with such events since the planning phase.

The *Green Procurement Guidelines*, published in 2013, were among the documents addressed to all Participant Countries for them to voluntarily adopt them.<sup>39</sup> The following year an updated version of the document was issued considering the legislative developments on compulsory technical characteristics of packaging for carrying goods.<sup>40</sup>

The following table summarises some of the main environmental criteria included in the *Guidelines*, as well as the principal environmental impacts each of them contributes to reduce and mitigate.

## GP CRITERIA ON FOOD & BEVERAGE

- ✓ Purchase of organic food
- ✓ Purchase of food from integrated production agricultural systems
- ✓ Purchase of fishery products that have been caught or reared in a sustainable way
- ✓ Purchase of animal products coming from breeding farms with high animal health standards
- ✓ Purchase of products with packaging containing high quantities of recycled materials
- ✓ Use of multi-use crockery, cutlery and tablecloths
- ✓ Use of sustainable paper products
- ✓ Selective waste collection and adequate training of operators
- ✓ Use of eco-friendly cleaning products for tableware and premises
- ✓ Use of low energy consumption electrical equipment
- ✓ Use of efficient and low-emission means of transport to support catering services

## MAIN MITIGATED ENVIRONMENTAL IMPACTS

- ✓ Eutrophication, acidification and toxic effects on human health and the environment due to bioaccumulation of pesticides and fertilisers from water, air, soil and food
- ✓ Soil erosion, forest destruction and loss of biodiversity caused by intensive farming systems, aquaculture and fishing
- ✓ Cruelty to animals and disrespect of their health
- ✓ High energy consumption for food production and processing
- ✓ High water consumption and pollution deriving from food production processes
- ✓ Packaging waste
- ✓ Excessive use of cleaning products causing health issues for workers as well as an increase in the pollution levels of waste waters
- ✓ High energy consumption caused by kitchen equipment
- ✓ Pollution due to necessary service-related transportation

## GP CRITERIA ON FURNITURE

- ✓ Purchase of legal origin wood sourced from sustainably managed forests
- ✓ Use of completely or partially recycled materials and renewable resources (wood)
- ✓ Absence of harmful substances in the production of materials and in surface coatings
- ✓ Limits in the content of organic solvents and VOC emissions in products, glues and substances in surface coatings
- ✓ Guaranteed easy separation of packaging materials and furnishing parts
- ✓ Purchase of furnishings and set-ups that are easy to disassemble, repair and recycle
- ✓ Design oriented to recycling, life-cycle extension and the promotion of green reuse systems (green design)
- ✓ Recyclability of employed packaging and preference for the use of recycled packaging

## MAIN MITIGATED ENVIRONMENTAL IMPACTS

- ✓ Loss of biodiversity, soil erosion and degradation due to non-sustainable management of forests and illegal deforestation
- ✓ Impact of mining activities on the landscape
- ✓ Use of non-renewable resources like metals or oil/natural gas for plastic
- ✓ High levels of water and energy consumption for the production of materials
- ✓ Use of harmful substances that may be released during the production process, use or disposal of furnishings and set-ups
- ✓ Use of organic solvents and production of VOC emissions
- ✓ High quantity of packaging waste

Table 3. Source: EU GPP Background Reports.

## The application of Green Procurement criteria by Expo 2015

The Organising Company of the Event, Expo 2015, had to meet a wide variety of procurement needs, always applying, as a public-law body, the Code for public contracts relating to jobs, services and supplies (Legislative Decree 163/2006).<sup>41</sup>

Since the first calls for tender of 2011 (before the publication of the *GP Guidelines*) the Company included references to sustainability criteria as relevant for the awarding of some essential operative services for the Exhibition Site (for example, innovation and sustainability had to be featured in the proposed technical solutions). Progressively, and in relation with the growing number of procurement activities in the event approach phase, more and more calls for tender were including green criteria.

37 ISO 20121:2012 Event sustainability management systems - Requirements with guidance for use.

38 EU Directive 2004/12/EC on packaging and packaging waste, implemented in Italy with Legislative Decree No. 152/2006, provides the following definitions:

a) sales or primary packaging: packaging conceived so as to constitute a sales unit to the final user or consumer at the point of purchase;  
b) grouped or secondary packaging: packaging conceived so as to constitute at the point of purchase a grouping of a certain number of sales units whether the latter is sold as such to the final user or consumer or whether it serves only as a means to replenish the shelves at the point of sale; it can be removed from the product without affecting its characteristics;

c) transport or tertiary packaging: packaging conceived so as to facilitate handling and transport of a number of sales units or grouped packaging in order to prevent physical handling and transport damage. Transport packaging does not include road, rail, ship and air containers.

39 The document was published on the PDMS (Participants Documents Management System) digital platform, specifically created to serve as a database to access all Guides and Guidelines developed by Expo 2015 SpA for the Participants.

40 Decree of the Ministry of the Environment of 18/03/2013, Identification of the technical characteristics for carrier bags (Gazzetta Ufficiale - Italian Official Gazette - General Series No 73 of 27/3/2013).

41 Code for public contracts relating to jobs, services and supplies enforcing directives 2004/17/EC and 2004/18/EC (Gazzetta Ufficiale - Italian Official Gazette - No. 100 of 2 May 2006).

Two factors contributed significantly to such result: on the one hand, as already stated, the publication of the *GP Guidelines* (September 2013) and, on the other, one year before the inauguration of the Event, the approval of a modification in the internal purchase procedure for all procurement requests related to supplies or services in the product categories subject to the application of Green Public Procurement criteria. The procedure adopted within the framework of the *Event Sustainability Management System*, elaborated following ISO standard 20121, implemented green criteria, wherever appropriate, for all purchases of supplies or services subject to GPP, also indicating the relevant technical specifications.

The combination of these two factors fostered the establishment of a good practice whereby the *GP Guidelines* were increasingly referred to and annexed to all calls for tender, as applicable to the supply involved in the purchase request. In some cases, in addition to the *Guidelines* criteria the purchase process included further requirements relating to different product categories (e.g. volunteers' uniforms, electronic equipment, cleaning services etc.) or stricter requirements for categories already considered in the guide (for example, requirements related to paper, inks, printing and binding were often added for the categories of publishing, printing and other similar services).

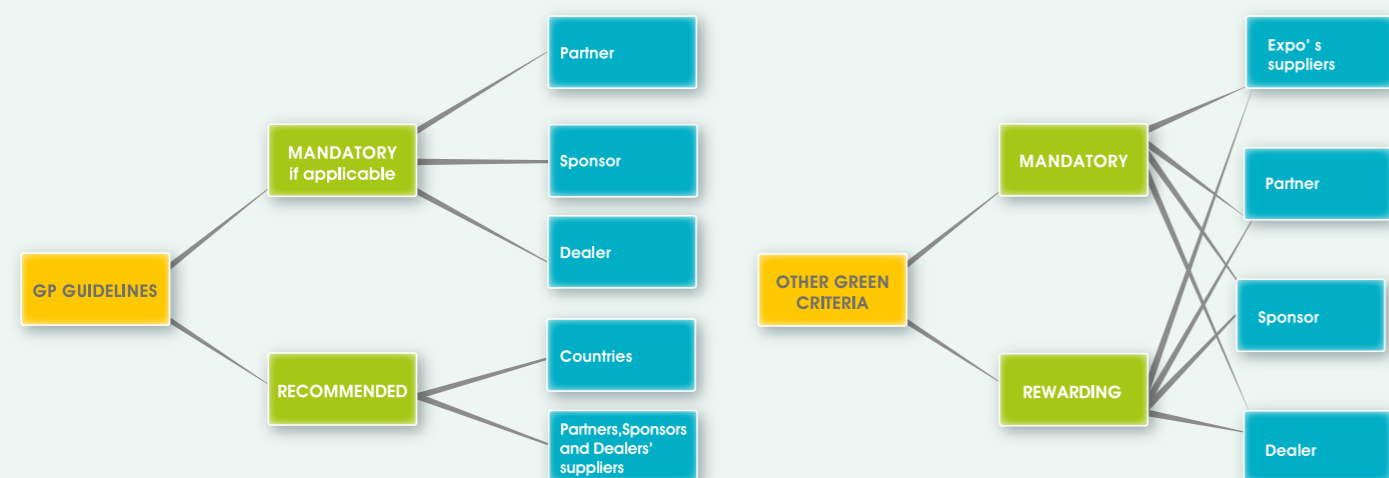


Figure 12

The selection of such further green requirements was always carried out taking into consideration both the nature and the relevance of the purchase demand, not only in a strictly economic sense but at times also in terms of external communication impact. For example, for supplies with a low economic impact (e.g. the printing of 1,000 catalogues) the inclusion of environmental criteria related to the sustainability of printing processes was generally limited to the request to use recycled paper or paper certified as sourced from forests managed in a responsible and sustainable way. On the other hand, concerning the publishing services for the creation and publication of all Exposition-related catalogues it was deemed appropriate to also include the characteristics of inks, the paper whitening process, the holding of specific environmental certifications by tenderers, as well as the usage of packaging made of 100% recycled materials.

Furthermore, once again based on the features and relevance of the supply, the fulfilment of the environmental criteria selected for each case was:

- ✓ either imposed as actual entry requirement for the tender;
- ✓ or included as 'rewarding criterion', meant as a relevant element in the calculation of the technical score to determine the ranking of the participants in the tender.

It is important to highlight that the texts of calls for tender published by the Company were always annexed to the final contracts, stipulated after the awarding, as integral parts of the contracts themselves and therefore binding for the parties. The ensuing consequence was that the *GP Guidelines* (as well as the further ad hoc green criteria possibly added for each case based on the subject of the supply) became automatically enforcing in contracts for the majority of Expo Milano 2015's partners and sponsors, insofar as they were applicable to the subject of the agreement.

## THE APPLICATION OF GREEN CRITERIA WHILE APPROACHING THE UNIVERSAL EXPOSITION

Expo 2015 started organising events aimed at promoting the Universal Exposition before its opening, in the so-called 'approach phase' and, in particular, during the last year of the event preparation. Such events were often strategically important for presenting the Theme, contents and main objectives of the Exposition to potential Participants as well as to the public. Within such framework, it was seen as fundamental to guarantee that the organisation of 'approach events' focused on minimising their environmental impact through the adoption of adequate green criteria.

To reach such an objective, the Company adopted an internal procedure to ensure, for all approach events directly organised by Expo 2015, the application of general green criteria (for example, fostering highly energy-efficient electronic equipment, selecting locations that were easily accessible on foot, by bicycle or public transport, providing containers for selective waste collection, favouring eco-friendly gadgets etc.) as well as specific green criteria for the promotional material that would be produced and handed out (for example, favouring electronic invitations or, alternatively, the exclusive use of recycled or certified paper for printing out flyers, programmes etc.).

Furthermore, for what concerned all approach events organised by third parties other than Expo 2015, but supported or sponsored by the Company, Expo 2015 itself always required that: "the internal person in charge of cooperating to the event will have to send the organising third party the 'Green Procurement Guidelines' document specifically contextualised to direct the activities of the organisers towards more sustainable practices and/or for them to integrate it in their contractual documents."

## THE BENI E SERVIZI (GOODS AND SERVICES) AND 'SIEXPO' CATALOGUES

The procurement-related tools put in place for Expo Milano 2015 also include the *Beni e Servizi* (Goods and Services) and *SiExpo* Catalogues. The former was an electronic platform coordinated by Expo 2015 and created with the objective to foster the cooperation between businesses, as well as to provide a comprehensive informative service to Participants and bring together demand and supply for event-related purchases.

The *SiExpo* Catalogue - online showcase for eco-friendly products and materials - was instead aimed at favouring the purchase of goods with eco-characteristics within the framework of event-related procurement. *SiExpo*<sup>42</sup> was dedicated to building materials, indoor and urban furnishings, packaging and exhibition accessories, all classified according to specific quality criteria on their innovation and eco-sustainability potential.

Overall, since the early awarding in 2011, the direct application of green procurement criteria by Expo 2015 allowed to exceed 70% of partnership and sponsorship contracts containing green criteria consistent with the subject of the specific supply or service. Furthermore, the Company decided to subject Participants to verification audits in order to determine the actual degree of application of the *GP Guidelines* and, more broadly, the respect of environmental criteria included in the various contractual obligations.

Some verifications took place within the *Towards a Sustainable Expo* programme.<sup>43</sup> The selection process of the Leaders for the categories 'Food & Beverage' and 'Green Procurement' was actually similar to a thorough verification audit<sup>44</sup> on the actual level of implementation of the environmental criteria set in the *Guidelines*.

Further random verifications involved those Participants that were considered of greater significance for environmental themes because of the special characteristics of their participation and the contribution they gave to the Event.

Overall, 17.5% of Participants including partners, sponsors and concessionaires of Expo 2015 or Padiglione Italia (the Italian pavilion) were subjected to verification. The outcomes are reported here below.

On the whole, the environmental criteria for the category Food & Beverage were the best implemented ones, coherently with the Theme of the Exposition and showing the specific attention paid by the Participants to the sustainability of food and catering services on offer.

The high percentage of partial implementation of some of the criteria can be explained by the presence of two different food sustainability approaches: on the one hand, organic production and the preference for PDO, PGI<sup>45</sup> or TSG<sup>46</sup> certified products, which are generally typical of small local producers; on the other, international standard certifications owned by suppliers (such as ISO 14001, EMAS, SA8000, OHSAS 18001,

Carbon Footprint and certified GHG inventories<sup>47</sup> etc.), which are instead typical of more structured medium to large companies, with longer and more complex supply chains as well as more visibility on the market.

While elaborating the *GP Guidelines* it was decided to support both types of engagement, which often brought to some difficulties in respecting all criteria at the same time. Some Participants, such as for example CIR-Food, ECCO Pizza e Pasta and COOP privileged organic and/or PDO and PGI products. Others preferred to turn to suppliers holding several certifications: for example, both Lavazza<sup>48</sup> and Unilever<sup>49</sup> certified their supply chains following the *Rainforest Alliance* standard for coffee and cocoa respectively; Lavazza also had an ISO 14001 certified catering supplier.

Finally, it is also important to highlight that many of the businesses participating in the Event were actually the direct producers of most of the food products on offer:<sup>50</sup> in such cases, the environmental certifications directly held by the concerned businesses were also considered as relevant.

	FOOD & BEVERAGE	FURNITURE	MERCHANDISING	PACKAGING	EVENTS ORG
APPLICABILITY	83%	88%	53%	76%	83%
TOTAL IMPLEMENTATION	53%	67%	22%	46%	33%
PARTIAL IMPLEMENTATION	47%	27%	44%	38%	67%
FAILED IMPLEMENTATION	0%	7%	33%	15%	0%

Table 4. Green criteria level of application.

Regarding *furniture*, the lack of a total adoption of green criteria was the result of two main elements: the focus on the choice of materials employed to build installations/set-ups on the one hand, and the allocation of such installations-set-ups for recovery/reuse projects in different realities and contexts after the Event on the other.

In the first case, there was an overall preference for the use of wood certified as sourced from forests managed in a sustainable and responsible way: for example, CONAF produced its furniture entirely with PEFC<sup>51</sup> certified wood. Some Participants also chose furniture accessories made of reclaimed materials: for example, pallets and fruit boxes for the set-ups of CIR-Food and Carlsberg Italia, recycled aluminium for the indoor structure of Granarolo's exhibition area, and more in general the use of wood, metal, plastic, cardboard or other recycled materials for the creation of various furnishings by many Participants.

For what concerns the recovery of materials after the Event, the tendency was to employ reusable furnishing accessories, such as electronic equipment, kitchens and, in some cases, the source materials for set-ups. For example, when disassembling its 'Kinder+Sport' structure, Ferrero will allocate the set-up to the creation of a paediatric infirmary in South Africa and school classrooms in Cameroon. Heineken Italia, for its part, planned the structure and flooring of its exhibition area so that they could be later easily disassembled, allowing the recovery and reuse of employed materials.

43 See chapter 4, page 83.

44 The activities carried out included: documents analysis, interviews, visits to the exhibition areas of the Participants in the Programme and consequent evaluation of the level of application of green criteria.

45 The Protected Designation of Origin (PDO) and Protected Geographic Indication (PGI) are labels for the legal protection of denomination awarded by the European Union (Reg. EU No. 510/2006) to, respectively, foodstuffs the specific qualitative characteristics of which essentially or exclusively depend on the territory where they have been produced (PDO), or for which a specific quality, reputation or other characteristics depend on the geographical origin and their production, processing and/or preparation take place in a specific geographical area (PGI).

46 The term Traditional Speciality Guaranteed (TSG) is an origin label introduced by the European Union (Reg. No. 509/2006) and aimed at safeguarding productions characterised by traditional compositions or production methods.

47 Respectively: ISO 14001:2004 ISO international standard on environmental management systems; EMAS registration by Reg. EU No. 1221/2009 also on environmental management systems; Social Accountability standard SA 8000:2008 on socially responsible business management; Occupational Health and Safety Assessment Series standard OHSAS 18001:2007 on Safety and Health of Workers management systems; ISO/TS 14067:2013 on the calculation of the carbon footprint of products throughout their life cycle; 14064:2006 on the quantification and reporting of climate-altering emissions created by an organisation.

48 See good practice on page 46.

49 See good practice on page 50.

50 Carlsberg Italia, for example, mainly offered its own beer, Unilever its own Algida ice creams, Illy and Lavazza their own coffee, Ferrero some of its own products, Coca-Cola its own drinks etc.

51 Programme for Endorsement of Forest Certification schemes is one of the standards to certify wood coming from controlled supply chains, guaranteeing that the material originates from forests managed in a fair, responsible and sustainable way.

2.3  
RESULTS  
GREEN CRITERIA FROM FOOD  
TO PACKAGING, FROM FURNITURE  
TO MERCHANDISING



With regards to *packaging*, all types employed were included in the scope of the green criteria, starting with primary packaging for food or merchandising products and ending up with secondary and tertiary packaging employed for their transportation, as well as for all the necessary supplies to carry out the activities of Participants on the Exhibition Site. The total implementation of green criteria was limited, especially for what concerns primary packaging. This was due to the fact that many products were foodstuffs, which means that product conservation or the respect of food security and hygiene regulations had to prevail on the choice of more sustainable materials and solutions for packaging.

Furthermore, the choices concerning packaging were often dominated by the suppliers of companies and linked with long-standing contractual relations on the products that such companies normally market: changing suppliers or imposing modifications in the usual packaging (especially if only for items provided for the exposition and not for the whole supply) was sometimes too complex from an economic standpoint but also because of the short amount of time available to organise the participation in the Event.

Regardless of such limitations there were some virtuous examples of packaging rationalisation and minimisation: for example, COOP favoured the use of cardboard and plastic packaging with high contents of recycled materials and created the model for a foldable and reusable fruit and vegetable plastic box.<sup>52</sup> Carlsberg Italia presented a new prototype for a PET recyclable beer keg, rather than using steel, since the former material does not require the use of CO<sub>2</sub> to prevent beer oxidation.<sup>53</sup> Finally, several businesses focused on the packaging of the merchandising products they distributed, using for example biodegradable packaging for coffee (Illy), certified FSC<sup>54</sup> packaging and paper bags (Coca-Cola) or entirely recyclable materials (New Holland Agriculture).

Concerning *merchandising* criteria, it is important to note that they surprisingly turned out to be the less applicable ones for verification since few Participants actually produced and/or distributed merchandising products during the Event. The Participants that focused more on environmental criteria were those that specifically created merchandising items for the Exposition, employing reclaimed materials and supporting manpower from contexts with economic and social problems. For example, Coca-Cola employed various merchandising products (bags, clothes, jewellery etc.) made of aluminium from its cans or PET from its bottles, mainly produced by communities of women from developing countries in the framework of the project '5by20'.<sup>55</sup> From another perspective, New Holland Agriculture proposed, in addition to a clothing line entirely made of organic cotton, an innovative model of mobile and tablet charger fed by small solar panels and inserted into a bag.

In the other cases taken into consideration the focus was clearly put on appearance and costs, and the merchandising products on offer were the same employed outside the Event and for other purposes.

Finally, during the six-month exposition a multitude of *events* of various nature were organised by the actors subjected to verification, present on site with their own dedicated spaces. Such events, be them laboratories and cooking shows or more traditional seminars and conferences, mostly focused on social and environmental themes linked with topics such as people's nutrition and wellbeing within a healthy and balanced diet or the sustainability of food supply chains.

CONAF deserves a special mention for the organisation, within the site, of the 6th World Congress of Agronomists entitled 'Food and Identity'; thanks to numerous thematic roundtables it brought to the publication of the *World Charter of Agronomists*, a document tracing the guidelines for future food

planning and representing the intellectual contribution of agronomists to the Milan Charter.<sup>56</sup>

Other Participants organised several meetings, seminars and short conferences open to all visitors of the Exposition, dedicated for example to the sustainability of the coffee (Illy) and cocoa (Eurochocolate) industries or to high-quality organic PDO or PGI traditional productions (Sicily Region).

Some Participants especially focused on the organisation of events for children, such as for example Fondazione Triulza's workshops on water, healthy food and environmental sustainability, involving more than 1,500 students; the entertainment paths elaborated by Ferrero to raise awareness among children on sport as a healthy, daily habit within the framework of the programme Kinder+Sport; or the lessons on responsible consumption promoted by COOP for more than 300 school classes from primary and secondary schools.

Finally, many other events were useful to boost and create institutional and commercial partnerships with clients, other Participants, institutions, businesses etc.

The auditing activities for this category showed that green criteria could have actually been conceived in a different way: given the configuration of exhibition spaces and the types of events organised, green criteria were respected automatically according to their implementation, or non implementation, in the other categories.<sup>57</sup>



52 COOP also carried out a Life Cycle Assessment (LCA) study comparing the above-mentioned foldable plastic box with traditional polypropylene boxes and with single-use cardboard ones; it was verified that the chosen option had the lowest overall environmental impact.

53 [http://www.carlsbergitalia.it/GetPage.pub\\_do?id=4028828d3970c92f013971e74fa0004c](http://www.carlsbergitalia.it/GetPage.pub_do?id=4028828d3970c92f013971e74fa0004c)

54 Forest Stewardship Council is one of the standards to certify wood coming from controlled supply chains, guaranteeing that the material originates from forests managed in a fair, responsible and sustainable way.

55 5by20 is Coca-Cola's global initiative aimed at ensuring the economic empowerment of 5 millions of businesswomen active in the company's value chain by 2020. More specifically, the project is aimed at small enterprises with which the company works in more than 200 countries all over the world: from fruit to craft businesses, the initiative has the objective to help women overcome the barriers on their path towards entrepreneurial success.

56 The Milan Charter (Carta di Milano), collecting more than one million signatures, is a fundamental cultural heritage of Expo Milano 2015. The Charter, written under the auspices of the Ministero delle Politiche Agricole Alimentari e Forestali (Italian Ministry of Agricultural, Food and Forestry Policies) and with the contribution of several experts, researchers, lecturers and key actors in the fields of sports, cooperation and communication, acknowledges the major challenge of feeding a constantly growing population without harming the environment in order to preserve resources for future generations. <http://carta.milano.it/en/>

57 Essentially, the food provided, the set-ups (including technical equipment, e.g. kitchens) used and the merchandising items distributed in the events were usually the same as for the usual activities in the exhibition areas.

## 2.4 RECOMMENDATIONS FOR THE FUTURE

### ✓ Adopt a green procurement policy

Formally adopt a policy concerning green procurement well in advance of the event's opening, so as to allow all actors participating in the event at the different levels to adapt their procurement processes to the commitments derived from such policy.

### ✓ Disseminate green procurement criteria

Promote the understanding and dissemination of such policy in all internal and external contexts potentially involved in purchase and supply procedures.

### ✓ Involve internal stakeholders

Adopt such internal procedures as to involve the organizational units in charge of sustainability-related matters in the preparation of calls for tenders for procurement activities of the event's organising body; it will thus be possible to thoroughly evaluate for every single case the convenience of including green criteria that are relevant and appropriate for the supply concerned.

### ✓ Train internal stakeholders

Appropriately train the personnel in charge of procurement activities on the legal terms concerning Green Public Procurement principles and related legislation; this is especially important for the categories of goods, services and/or activities that potentially have a greater impact on the environment and therefore require the inclusion of green criteria.

### ✓ Define guidelines for the organising body

Produce reference guidelines including all green criteria that are relevant for the categories of products and services purchased by the organising body more frequently and in bigger quantities.

### ✓ Define guidelines for participants

Produce reference guidelines, including the most relevant green criteria for the categories of products and services, the participants in the event will supposedly have to purchase, also considering its theme.

### ✓ Indicate clear purchasing rules

Prepare clause models including specific green criteria to be repeated whenever similar purchase needs arise (e.g. regarding the choice of paper for all printing-related purchases).

# GOOD PRACTICES

**LAVAZZA**  
TORINO, ITALIA, 1895



At the Universal Exposition of Milan, coffee – one of the icons of Italian lifestyle in the world – was represented by Lavazza in its role as *Official Coffee* of Padiglione Italia.

Such a distinction provided the company with the opportunity to enhance the experience already gained in the sustainability field, with a focus on themes concerning the environmental and social aspects related both to the organisation and setting up of its exhibition space (*Piazzetta del Caffè - Lavazza, Italy's favourite coffee*, located at the south-west end of Cardo street)<sup>a</sup> and to the procurement of goods and materials according to the *Green Procurement Guidelines* set by Expo 2015.

The company's tangible engagement, in line with the sustainability key points of the Event, characterised all the different aspects of Lavazza's participation in Expo Milano 2015, starting with the quality and characteristics of the product on offer. Visitors were indeed offered *iTierra!* coffee, a 100% arabica blend coming from *Rainforest Alliance*<sup>b</sup> certified farms. Obtaining such a certification implies respecting a series of environmental and social criteria aimed at safeguarding biodiversity and life conditions of coffee farmers, including the protection of aquatic ecosystems, the reduced and limited use of chemical agents, fertilisers and pesticides, the respect of labour laws and of all rights of workers across the supply chain.

A further distinctive and characterizing feature of Lavazza's participation in Expo 2015 as a representative of the coffee industry regarded the production of two studies on the carbon footprint of coffee, and more precisely:

- ✓ the carbon footprint of a cup of coffee prepared with a moka pot using a 250-gram *Kafa* coffee package;
- ✓ the carbon footprint of 1 kg of *iTierra!* roasted coffee beans.

Both studies followed the requirements of international technical standard ISO/TS 14067:2013<sup>c</sup> and were verified by an independent third party. The knowledge of the environmental performance of a company's own products – aimed at reducing impacts and developing new solutions combining quality, innovation and eco-compatibility – is a cornerstone of Lavazza's sustainability model: its Life Cycle Thinking approach considers the product as the outcome of a process chain driven by sustainability all the way through, from the raw material to the finished product and as far as seeing the end of life of the product in new ways.<sup>d</sup>

Following the same approach in its participation in Expo Milano 2015, Lavazza also applied sustainability criteria to the selection of suppliers for food and beverages on offer, the set-up of the exhibition space, merchandising products and more in general all packaging employed.

a As well as at Padiglione Italia's Piazzetta del Caffè, which bore the signature of architect Fabio Novembre, Lavazza was present in another 18 locations, among which Il Supermercato del Futuro by Coop in the Future Food District, Vanke Pavilion, Eataly cafeterias and at several partners' of Padiglione Italia's such as Peck, Terrazza Martini and European Union.

b www.rainforest-alliance.org - Rainforest Alliance is an NGO operating in about 100 countries in the world. Since 2004 it has offered Colombian producers the possibility to have their coffee certified according to the standards set by the Sustainable Agriculture Network (SAN), which were drawn up thanks to the combined efforts of farmers, scientists, local communities and environmental associations (respecting the criteria of SAN's chain of custody).

c The technical specifications included in Greenhouse gases - Carbon footprint of products - Requirements and guidelines for quantification and communication include principles, requirements and guidelines for the quantification and communication of the carbon footprint of a product, based on International Standards on life cycle assessment (ISO 14040 and ISO 14044) for quantification and on environmental labels and declarations (ISO 14020, ISO 14024 and ISO 14025) for communication. www.iso.org

d Lavazza collaborates with the European Commission and the Italian Ministry for the Environment to define standards for the coffee sector aimed at quantifying the environmental impacts following shared methodologies and processes. It participates in round-tables developing Product Category Rules at the national level and collaborates to the European Products Environmental Footprint programme.

Following the same approach in its participation in Expo Milano 2015, Lavazza also applied sustainability criteria to the selection of suppliers for food and beverages on offer, the set-up of the exhibition space, merchandising products and more in general all packaging employed.

In particular, the partner selected for providing catering services had implemented an Integrated Quality and Environment Management System, certified in accordance with ISO 9001 and ISO 14001 standards, and was able to properly manage all activities that could have an environmental impact while respecting the regulations in force on food security and hygiene, environmental safeguard and workplace safety. In providing services, disposable items (saucers, stirrers) made of biodegradable and compostable materials were employed, while cutting-edge espresso machines and other appliances were chosen for their superior energy efficiency.<sup>e</sup>

All the staff was trained and informed on the importance to minimise environmental impacts and properly manage waste, in line with the *Waste Management guideline* drawn up by Expo 2015. Products used for cleaning had ecological quality labels like *EU Ecolabel* and *Scandinavian Nordic Swan*.

*Piazzetta del Caffè* was also designed and built following sustainability criteria. The space was set up with a structure combining original design and respect for the environment, which would be reusable for future events and made of materials producing little polluting emissions and originating from certified and mostly recyclable sources. For example, wooden parts were made of PEFC-certified materials, while the iron used for metal parts contained 30% recycled materials. With a view to post-event reuse, the café counter was made of sections connected by bolts, and it was possible to entirely disassemble and recover it for future installations. The covering of the square was conceived as temporary structure made of iron tubing with bolted joints, once again easy to be later disassembled and recovered in its entirety. The paving was realised as a floating floor, not anchored to the ground, and it was also recovered for other purposes at the closing of the event.

On-site communication activities were oriented towards minimising environmental impacts, too. All information related to the company and services provided were managed electronically, without making use of paper promotional materials, thanks to a video wall covering the front wall of the café and the spiral of the installation, upon which keywords related to the products on offer were displayed. Furthermore, service staff were equipped with tablets with information on the brand, product and history. The following were included in the merchandising offer:

- ✓ shoppers with the joint logo *Lavazza - Padiglione Italia*, made of FSC-certified 100% recycled paper;
- ✓ espresso and cappuccino cups and mugs in an FSC-certified, compostable, recyclable and completely chlorine-free packaging.



Among the initiatives put in place by Lavazza for Expo 2015, the *Food Recovery* plan needs to be mentioned; it was carried out thanks to the collection of coffee grounds coming from products offered to visitors in the *Piazzetta*, destined to social cooperative Il Giardinone for transformation into compost and substrate for edible mushrooms. The initiative was aimed at the creation of new production supply chains and start-ups in a circular economy framework.

Overall, the extent of the commitment and considerable number of initiatives carried out for Expo Milano 2015 allowed the company to qualify among the leaders in the 'Food' and 'Green Procurement' categories of the *Towards a Sustainable Expo* programme.<sup>f</sup>

Such recognition reflects all the work carried out in the field of sustainability for Expo 2015, an event interpreted and exploited by Lavazza as a unique opportunity to present and promote good practices related to the organisation of a mega-event, also through the precious collaboration of partners and suppliers.

e Energy-efficient Wega Green espresso machines.  
f See page 83 for further information.



## AND THE SUSTAINABLE FARM PAVILION



New Holland Agriculture, one of the world leaders in the agricultural mechanisation, was the only manufacturer of farming machinery present at EXPO Milano 2015 with its *Sustainable Farm Pavilion* which took inspiration from its *Clean Energy Leader* strategy for its concept and construction. This strategy encompasses a complete range of products, innovative technologies and integrated agricultural practices, aimed to reduce the environmental impact of farming activities. This means reducing farmers' dependence on fossil fuels, promoting the production and use of fuels obtained from non-food plants and indicating a clear road map towards an energy independent farm.

This striking building was instantly recognisable by its huge sloping grass-covered roof, which featured a *T6 Methane Power* prototype tractor on the rooftop. The pavilion was built using advanced technologies including dry construction, which generated notable reductions in the time needed to assemble and – later – to dismantle it. The fact that the structure was built and fitted out avoiding the use of cement or any other kind of binder materials meant that at the end of the Expo event no damaging demolition work was necessary, thus allowing the subsequent re-use of practically the entire building. The main framework of the entire structure, including its foundations, was made of steel. This had the evident advantage of a cleaner and better organised building site, since the procedures required were limited to the assembly of pre-existing components.

Sustainability and efficiency were also key concepts in the use of two resources fundamental not only in farming activities: energy and water.

Part of the energy needed to run the pavilion was generated by photovoltaic cells built into the glass southern façade of the building, while further energy savings came from a system of natural ventilation and from the outstanding thermal insulation provided by the grass covering the roof. The rainwater collected by a specific channelling system was stored and used to irrigate the roof.

Thanks to its modular construction, the *New Holland Sustainable Farm Pavilion* was dismantled and will soon have a second and permanent life as a Brand location in Europe.

However, New Holland's *Clean Energy Leader* strategy was not only the inspiration behind the pavilion's construction, it was also the theme of the whole immersive and interactive visit experience.

The challenge of New Holland was to show to the general public – made up largely of non-specialists – how it sees and conceives the present and the future of agriculture and to describe the key role played by agricultural machinery in the food supply chain by preserving the natural resources and reducing the environmental impact.

The global commitment towards a more efficient agriculture and a fair and sustainable future is fully consistent with the pillars of the *Clean Energy Leader* strategy, rooted in the conviction that farmers can use technology to improve the production of quality food and clean energy, while also reducing pollution, waste and human fatigue.

The *Sustainable Farm Pavilion* sowed the seeds of a far wider and deeper knowledge of the agriculture of today and of tomorrow. Farmers will have to produce more with less: less seeds, less pesticides, less fertilisers, less water, less waste, less residues, less pollutant emissions and above all less energy generated by fossil fuels.

This last concept was at the heart of the pavilion's visit experience: the *Energy Independent Farm*. It is one of the key pillars of the *Clean Energy Leader* strategy and it is based on the idea that farmers can autonomously provide for their energy needs, by using, recycling and transforming the by-products of the day by day farming activities thanks to the integrated use of renewable energy resources such as sun, wind and biomass.

The *T6 Methane Power* tractor displayed on the Expo pavilion's rooftop is not only the concrete and perfect testimony to this concept. It also represents a key step to achieving and implementing the goal of an *Energy Independent Farm*.

Developed from a standard tractor model, this prototype is equipped with an engine powered by compressed natural gas that is contained in nine tanks perfectly integrated in the tractor. They provide sufficient autonomy for a half day's work in the fields.

The biomethane that fuels the tractor can be entirely produced within the farm, using vegetable production waste and animal manure. These two 'raw materials', once considered as waste, when combined inside the so called 'digester', generate biomethane along with a dry residue dense with nitrogen, which makes an excellent fertilizer. This virtuous cycle of producing energy on the farm from agricultural by-products is ideally completed when one considers that – compared to a tractor engine powered by traditional diesel – the biomethane tractor produces 80% less pollutant emissions.

For farmers who intend to combine greater productivity and efficiency with environmental respect, New Holland provides a series of advanced technologies for precision farming which are also simple and intuitive to use. This involves a series of practices which permit a drastic reduction of production costs – on seeds, fertilizers, pesticides and fossil fuels – bringing immediate financial savings but also, and above all, increasing productivity and protecting soil integrity.

*Precision Land Management* (PLM) systems include dedicated satellite devices that make it possible for tractors and harvesting combines to 'memorise' the precise layout and contours of a given field, allowing it to be worked in almost total autonomy and avoiding both 'missed out' and overlapping areas. With the most advanced systems, the machinery involved can exactly repeat, year after year, the same operations on the same piece of land, with an error margin of just 2-3 centimetres. Another example is given by the advanced integrated sensors in harvesters; thanks to dedicated software they provide important data on the harvest output and contribute to improve its quality, measure the use of production means and minimise costs.

These technologies were part of the *Sustainable Farm Pavilion* at Expo Milano 2015 that attracted over 850,000 visitors and offered glimpses of how a new and different agricultural model is not only possible but also real and feasible today. This agriculture is capable of answering both the economic needs of those who work the land and the nutritional needs of the world's population without depriving the planet of its fundamental resources and without creating additional sources of environmental damage.



*'Being the only manufacturer of agricultural machinery present at Expo Milano 2015 represented a huge responsibility. Our mission was to explain – in a simple, accessible and convincing way – the close and natural bond between food and agriculture, stripping it of its fake 'romantic' aspect and focusing instead on the real concrete ability of innovative and good technology to produce food for all in a more responsible, clean and sustainable way. It was a challenging task, and we faced it with determination. We are proud to have achieved our goal, confirmed by public attendance and response. Expo Milano 2015 was a positive and exciting experience for our Brand. We have sown seeds that will have good results for agricultural mechanisation and for New Holland, for many years to come.'*

**Carlo Lambro, Brand President,  
New Holland Agriculture**





Unilever participated in Expo Milano 2015 as *Official Ice Cream Partner* with its own Italian brand Algida. Its presence on the site was characterized by the setting of two small piazzas at different locations along the Decumano (Decumanus or main street): *Casa Algida*, entirely dedicated to the Italian brand and its historic products, and *Magnum Pleasure Store*, where visitors were able to create their *My Magnum* ice cream on the spot and have it prepared for them. Furthermore, Unilever provided a moving ice-cream distribution service throughout the Exposition Site by means of the *Algida Ice Bikes*.

In 2010 Unilever had already decided to revise its growth strategy, redirecting it towards sustainability by designing the *Unilever Sustainable Living Plan*, whereby the multinational company set a target to be achieved in 10 years: to reduce the environmental impact of its products by half, derive 100% of its agricultural raw materials from sustainable productions and help one billion people to improve their health and wellbeing. The participation with its historic ice-cream brand *Algida* in Expo Milan 2015, mega-event dedicated to sustainable food production and nutrition, represented the right opportunity for Unilever to show its engagement in the search for more sustainable production and supply methods.

This multinational company is indeed a virtuous example for supply chain control thanks to a well-established system of selection and verification of its suppliers based on their social and environmental performance.

Through the *Sustainable Agriculture Code* Unilever has identified more precisely a series of environmental and social criteria that all its suppliers have to stick to or else be excluded from the supply chain. The code refers to 11 sustainability macro indicators, including fertilisers and fuels, soil, water, biodiversity, waste management, energy, greenhouse gases, social and human capital, value chain. The company has also signed an agreement with Rainforest Alliance<sup>a</sup>, committing to guarantee that all the cocoa used to produce its ice creams is 100% certified by 2020. The objective has already partially been reached: since 2015 all single-wrapped Magnums, including those sold at Expo, have been produced with 100% Rainforest Alliance certified cocoa.

As far as packaging and, more generally, the use of wood-fibre- based or wooden materials are concerned, Unilever has committed to eliminate all supplies contributing to the phenomenon of global deforestation by only buying and using recycled and/or FSC or PEFC certified materials. Such policy therefore involves all the wood-fibre packaging as well as the pallets used for transportation, office paper etc. Accordingly, only FSC or PEFC certified wood was employed to build *Casa Algida* and *Magnum Pleasure Store*.

Magnum sticks and the paper material used to produce the *Café Zero* cup are another two examples of the application of such policy, as they are both PEFC certified.

At the beginning of 2015, Unilever also set the objective to become a 'zero waste' multinational company, therefore being able to guarantee that all the waste and obsolete products coming from factories, logistical and distribution centres as well as from offices are recycled instead of landfilled. The objective has currently been reached at around 700 sites in 70 countries.

Following this approach, almost all ice creams sold during the Exposition had been produced at the zero-waste factory of Caivano (Naples), where the reuse of ice cream production waste further reduces the environmental impact of the production itself.

The attention paid to the topic of waste has also been shown by the designing and building strategies for the creation of the Algida and Magnum piazzas, since the structures were conceived to be later disassembled and reused: *Casa Algida* will be re-built in a park in the EUR neighbourhood of the city of Rome.

Algida's commitment for the environment was also evident in the use of the *Ice Bikes* and of energy-efficient freezers and machinery.

Unilever's participation at Expo Milano 2015 also saw the involvement of visitors in an experience aimed at illustrating the whole production process, the ecologically sustainable commitments of the brand and the food and nutritional aspects linked to the products. Special attention was paid to children through the organisation, together with the Expo School Project<sup>b</sup>, of educational activities with nutrition experts and entertainment with Algida's mascots; the objective was teaching the little ones, too, how to integrate ice cream into a healthy and balanced diet. A total of around 2,500 children participated in these playful and educational initiatives.

Furthermore, during the Ice Cream Festival organised on the Site on August 15, Algida donated to Save the Children 50% of its earnings from the sale of *Share the Love* cones, as well as more than 10,000 ice creams to the inmates of Bollate's prison (located in Milan's area). In addition to that, for the whole duration of the Exposition Unilever organised the *Unilever Round Table on Sustainability*, a thematic itinerary dedicated to sustainable development aimed at promoting a dialogue between institutions, associations, NGOs and businesses in order to find concrete answers to some of the great challenges the planet is currently facing, such as sustainable agriculture, wasted and accessible food, women's social inclusion and empowerment.



<sup>a</sup> Rainforest Alliance is an international non-profit, non-governmental organisation (NGO) founded in 1987. Its mission consists in preserving biodiversity and guaranteeing sustainable means of subsistence, transforming land use practices, business practices and consumer behaviour. The agricultural project Rainforest Alliance supports the international secretariat of the Sustainable Agriculture Network (SAN), a coalition of leader groups in the preservation field, bringing together responsible farmers and consumers under the Rainforest Alliance certified seal of approval.

<sup>b</sup> The School Project guided students from all kinds of schools along a path of discovery and learning, starting with classwork on the theme of Expo Milano 2015, Feeding the Planet, Energy for Life, and ending with the visit to the exhibition site. The final goal was creating contents and experiences for future generations.



3  
WASTE:  
NO MORE WASTE BUT  
NEW RESOURCES

Management of waste, meant as refuse from materials and goods at the end of their life cycle, involves side effects of environmental, economic and social significance. The efficient use of resources – including materials – is one of the flagship initiatives of the Europe 2020 Strategy, aimed at fostering a smart, sustainable and inclusive growth. Saving on waste by recovering and recycling it entails environmental advantages in terms of lesser input of raw materials, reduced pressure on air, water and soil, as well as creation of major opportunities for businesses, investments and employment.

From a more general geopolitical and strategic point of view, adopting and maximising reuse and recycle practices is an effective answer to the 'resource scarcity crisis', which European institutions such as the European Environmental Agency now consider an official issue.

The main points of reference in the European legislation and the relevant enforcement measures at the national level can be listed as follows:

- ✓ EU Directive 2008/98 (Waste Framework Directive), which confirms and reinforces the EU hierarchy of waste management options, according to which absolute priority is given to reduction, followed by reuse and recycle, with other recovery options (including energy recovery) having a secondary role and disposal being at the bottom of the list; it also defines a joint objective of 50% material recovery by 2020, which implies giving a central role to selective waste collection and recycling practices in any waste management strategy.
- ✓ Italian Legislative Decree No. 152/06 (*Testo Unico dell'Ambiente* - Environmental Consolidated Act), which provides for levels of selective waste collection of no less than 65% of the total municipal and similar waste; this objective is actually coherent with the 50% material recovery target derived from the Framework Directive (and successively integrated in the Consolidated Act): since material recovery should be calculated net of recycling and composting residuals, there is a reciprocal coherence between selective collection and material recovery objectives.
- ✓ The new Circular Economy Package, approved on 2 December 2015 after being repeatedly advocated for by the European Parliament (for example through the Resolution on the environmental action plan of 24 May 2012); it contains proposals to review some key directives on waste and provides for several ancillary measures to be defined and implemented in the following months and year.

Expo 2015 actions for the management of waste produced during the organisation of the Event were shaped on European Community indications, the Italian law (Legislative Decree 152/2006) and the provisions by Giunta Regionale Lombardia (Regional Council), Resolution No. 1990, approved on 20 June 2014 by the Giunta Regionale, provides for a regional waste-management plan (PRGR) that pays special attention to the debate on shifting from a linear to a circular economy model and, consequently, aims at minimising the input of new primary resources and maximising the recovery of material resources from waste. In particular, PRGR updated the objectives included in the previous planning tools, raising the selective collection target from 50 to 67% (to be reached by 2020) and identifying a waste reduction target of 9% on specific production (kg/inh. year).

The waste management strategic and operative choices made by Expo 2015 while running the Event, aimed at preventing waste production while maximising material recovery from scraps, were in line with the indications from the regional directive framework.<sup>58</sup>

<sup>58</sup> Thanks to Massimiliano Stucchi, responsible for the Expo Project of AMSA and A2A.

### 3.1 DEFINITION TYPES AND QUANTITY OF WASTE FROM MEGA-EVENTS

The waste produced on the Exhibition Site was identified by type and source as follows:

- ✓ building materials from construction, maintenance and demolition of buildings and structures;
- ✓ organic waste from maintenance of green areas, from kitchens operating on the Exhibition Site to provide meals for visitors (catering and food services) and from actual food consumption;
- ✓ other waste (mainly from packaging and various maintenance materials) produced by exhibition activities (including procurement) and by visitors.

According to the current regulation applicable to exhibition sites,<sup>59</sup> waste is classified into:

- ✓ municipal waste;<sup>60</sup>
- ✓ special waste similar to municipal one;<sup>61</sup>
- ✓ special waste.<sup>62</sup>

As a first step to understand how to organise the management of municipal and similar waste<sup>63</sup> produced by such a big and complex event, Expo 2015 searched for reference from similar and comparable cases. No data were available from recent Universal Expositions (Yeosu 2012 or Shanghai 2010), which were characterised by completely different legislative and organisation systems anyway. The only previous experiences with similar characteristics, also comparable from the regulatory point of view, were *London 2012 Olympics* and *Salone del Gusto 2014* in Turin.<sup>64</sup> These events, which reached selective waste collection levels of about 65%, were useful to gather a relevant number of good practices and, on the other side, some indications on the mistakes not to be repeated. Again, it was however not possible to make reference to equivalent organisation conditions as regards, for example, catering and procurement models, period of permanence of visitors at the venue, multi-stakeholder management. Therefore, the same quality (waste composition) and quantity (kg of production/visitor or kg/m<sup>2</sup>) indicators could not be adopted nor applied to the Expo 2015

<sup>59</sup> Legislative Decree No. 152/06 and Regolamento per la gestione dei rifiuti urbani ed assimilati e la tutela del decoro e dell'igiene ambientale del Comune di Milano (Rules for municipal and similar waste management safeguarding the decorum and environmental health of the Municipality of Milan).

<sup>60</sup> Municipal waste includes waste of any type and from any source lying on public roads and areas or private roads and areas subject to public use, on waterway banks or deriving from street sweeping.

<sup>61</sup> This is non-household waste the nature of which allows for the same management as household waste; this is the case with Expo Milano 2015 waste including paper and cardboard, glass, metal, wood, plastic and organic waste for composting.

<sup>62</sup> Waste deriving from industrial, artisanal, commercial, service and sanitary activities that may be carried out in the common parts and in the areas run by Participants and operators present on the Exhibition Site. Special waste can be classified as hazardous or non-hazardous depending on its characteristics.

framework in order to ascertain the volumes involved and set up an appropriate collection model.

Since 2011 Expo 2015 had made a preliminary estimate of waste types and volumes to be introduced in its Study on *Environmental Impact*; later on, a second estimate was elaborated in 2013 for dimensioning and organising the service; lastly, a third one was produced just before the beginning of the Event, updating data on the basis of the choices made in the meantime concerning the criteria for catering services.

The chart on the right shows the most relevant waste categories (municipal and similar) related to exhibition, catering and meal consumption activities both inside and outside food outlets.

The forecast had been carried out following an analytical/inductive criterion and had brought to a preliminary figure for compostable waste ranging between 25 g per visitor (breakfast) and 350 g per visitor (other meals at restaurants); the figure for compostable single-use catering ranged between 10 and 55 g per visitor. Parallel estimates had been made following a parametric approach and resulted in sensibly higher data, bringing to an estimated specific production of 1.25 kg per meal (1.13 kg excluding packaging).

Lastly, the preliminary planning phase was completed by monitoring the evolving situation of waste plants in the region both in 2011 and 2014 so as to evaluate their congruence with the estimated streams of waste generation.

In both cases the analysis confirmed the existence of sufficient plant capacity for the estimated waste streams to be originated by the management of the Event, since the total quantity of waste would be marginal compared to the overall amount of waste generated in the region. The analysis focused more specifically on plants for the treatment of compostable waste (food, catering and green waste) and also on recyclable dry matters.



Figure 13

<sup>63</sup> For the sake of brevity only municipal and similar waste will be taken into account; as for special waste, AMSA (the company responsible for waste collection in Milan) collected 859 tonnes, accounting for 12% of the total waste produced and subdivided in the different Event's phases as follows: 37% in the set-up phase, 58% during the event phase and 5% in the dismantling phase closed in December 2015. It must be noticed that the actual total amount was certainly higher for two reasons: a) the operators in charge of maintaining installations and greenery were allowed to manage their own special waste autonomously, as provided by Italian law; b) all Participants could use their own service suppliers to collect and remove waste from the exhibition site. Most Participants took advantage of the services provided by AMSA upon call and according to their needs, which makes the figures here reported for quantities by type and originating phase, representative anyway. Special waste produced by construction activities are here not considered since it is regulated by a special disposal procedure.

<sup>64</sup> By comparison, London 2012 Olympics (78 days' event, 11 million spectators, 21,000 journalists, 200,000 operators and 14,700 competing athletes) attained 62% of selective waste collection; Salone del Gusto 2014 in Turin and Fa' la Cosa Giusta 2015 in Milan (both 3-to-4-day events paying special attention to the themes of sustainability and selective waste collection) reached about 65% of selective waste collection.



3.2

## OUR APPROACH PREVENTION ACTIONS TO REDUCE WASTE

### Water houses to reduce waste from bottles

The Memorandum of Understanding between Expo 2015, the CAP Group companies (CAP Holding and Amiacque) and Metropolitana Milanese (2012) made it possible to have a capillary distribution of mains water during the Event. The 30 public 'water houses' (water dispensing kiosks called *Casette dell'Acqua*) installed at this avail at various strategic locations of the Site dispensed more than 9.5 million litres of water; this significantly contributed environment improvement insofar as logistics activities and post-consumption packaging management were avoided.

The installation of such a widespread network of free public water supply definitely discouraged people from buying bottled water. Nevertheless, it must be mentioned that it was not possible nor appropriate, both for ensuring security and guaranteeing essential services, to prohibit the sale of bottled water in cafés, considering the hot season and the forecasted average of 150,000 visitors a day. It was indeed necessary to guarantee water availability for everybody at any moment in case of overcrowding or temporary unavailability or malfunctioning of some dispensers; finally, it was necessary to allow visitors with special needs to choose water with specific characteristics, and in this sense Expo 2015 also seized the opportunities offered by sponsorship with producers from the water industry. At the end of the Event the water kiosks were installed in Milan and in some neighbouring municipalities for their second life.

### Packaging reduction

The guidelines developed for Participants<sup>65</sup> by Expo 2015 included the most relevant sustainability criteria for the purchase of food & beverage products and services, packaging and gadgets. This way, Participants were urged to adopt specific sustainability strategies for packaging reduction, transportation, management and storage of goods. Due to their nature, the effect of such preventive actions and their resulting in the non-production of scrap materials is difficult to monitor and evaluate ex-post. As it will be mentioned later on in the current text, the actual quantity of waste produced during Expo Milano 2015 was lower than what expected based on previous experience, which was certainly due to the peculiarities of catering models and logistics constraints but also to the tendency of operators to reduce packaging abuse, considered uneconomical.

65 Green Procurement, Food & Beverage, Logistics, Commercial Activities within the Expo Site.

## CONFLICTING OBJECTIVES

It is interesting to highlight how some directives, thought primarily to minimise environmental impacts, need a 360° analysis – and at times reconsidering – to identify unwanted side effects that may neutralise the expected advantages.

### CASE A)

A provision in the Environmental Impact Assessment procedure required the supply of disposable cups made of compostable and biodegradable material (EN 13432 certified) to be used at the public water points, so that the waste stream originated by them could be forwarded to composting. Expo 2015 analysed the critical issues of such an initiative: costs for purchasing, distribution to visitors and the specific post-consumption collection of cups that had presumably been used only once by each visitor any time they needed to drink, not to mention the logistics issues of procurement, storage and distribution. Kiosk builders were therefore encouraged to design dispensers that would be suitable to supply water with or without a container while guaranteeing hygienic safety conditions. This way visitors with or without their own flasks, bottles or cups were able to drink freely without adding up to the waste stream.

### CASE B)

For the safety of visitors and selective waste collectors on the Exhibition Site, a limited use of glass packaging for food and beverages was requested. In particular, restaurants and food outlets were asked to encourage people to leave packaging in catering areas so that service staff would collect it. In the event of consumption outside the food outlet, bottled products would have to be served in disposable cups (made of certified compostable and biodegradable material), in order to keep empty bottles at the counter. Such regulation clearly brought to a greater use of disposable cups, and therefore to the production of related post-consumption waste.





## Disposable plates and cups (and more)

In order to prevent waste production from catering services, suggestions were put forward to use plates, cups, cutlery etc. (that is, all types of tableware) made of such materials as to be washable on site and reusable, as well as to provide water and beverages on tap.

A fundamental criterion adopted to maximise recovery, instead, consisted in the request, whenever washable and reusable tableware had not been provided for, to employ compostable and biodegradable (EN 13432 certified) disposable items, thereby simplifying the set of recommendations for visitors/clients regarding the correct sorting of waste produced by consumption activities within catering areas.

Paving the way for a complete application of the provision was also given great importance. In this sense, the industry producers were invited to attend information sessions on potential requests that might arise during Expo 2015 semester, with special reference to the opportunities offered by the *Catalogue for Expo Milano 2015 Participants*.<sup>66</sup> Indeed, the catalogue represented a virtual space where companies producing various categories of goods introduced themselves to Participants to offer their support in the designing, construction, set-up and management of pavilions through the provision of goods or services. Products admitted as disposable tableware (that is, EN 13432 certified) constituted a specific category, which 4 single firms and a group of companies signed up to.

The above-mentioned provision for Participants was included in the *Food & Beverage and Green Procurement Guides*, as well as in concession and sponsorship contracts for the food & beverage sector; it was also recalled several times in organisation conformity communications.

At the end of July 2015 a thorough verification was carried out at all 168 food outlets on the Site in order to check the actual compliance with the provision and identify corrective actions whenever necessary.<sup>67</sup>

Figure 14 shows the share of each category of tableware employed:

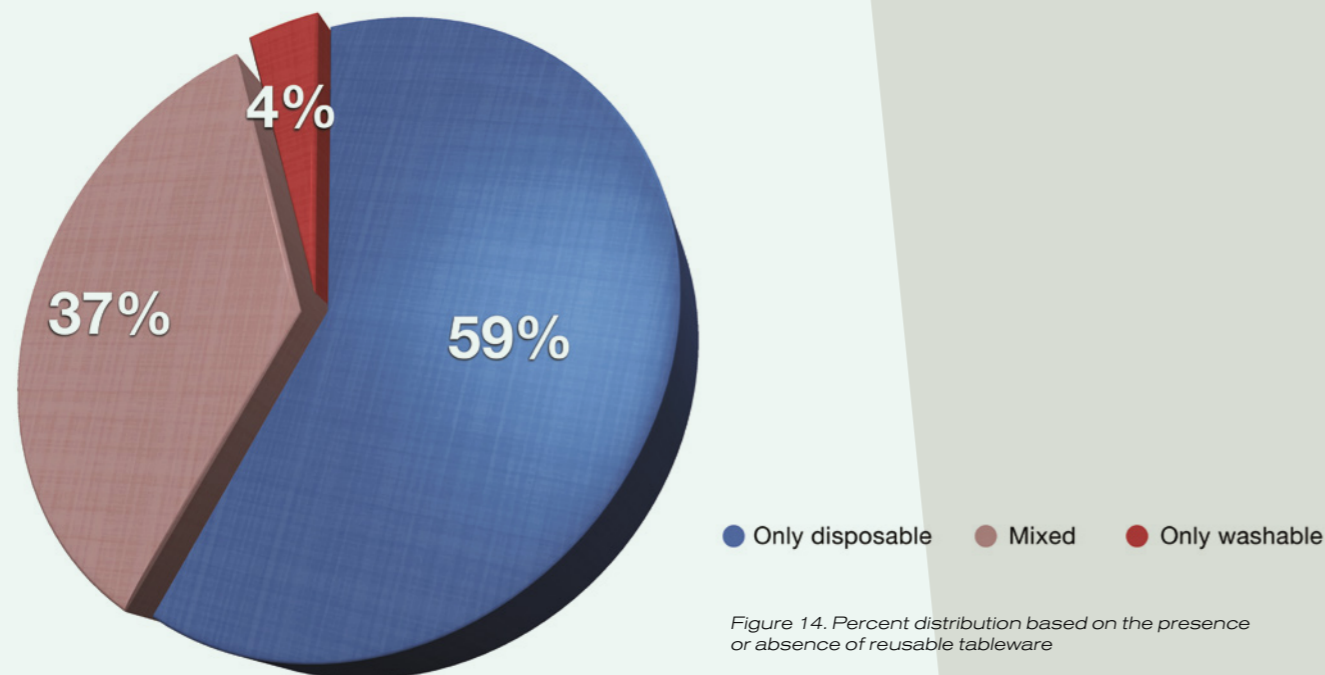


Figure 14. Percent distribution based on the presence or absence of reusable tableware

Participants largely employed disposable tableware, which can be explained by operational conditions at most catering facilities, mainly focused on take-away and rarely offering table service.

The distribution of the various item types is reported in the following figure, showing which products showed a greater uniformity or mix of materials.

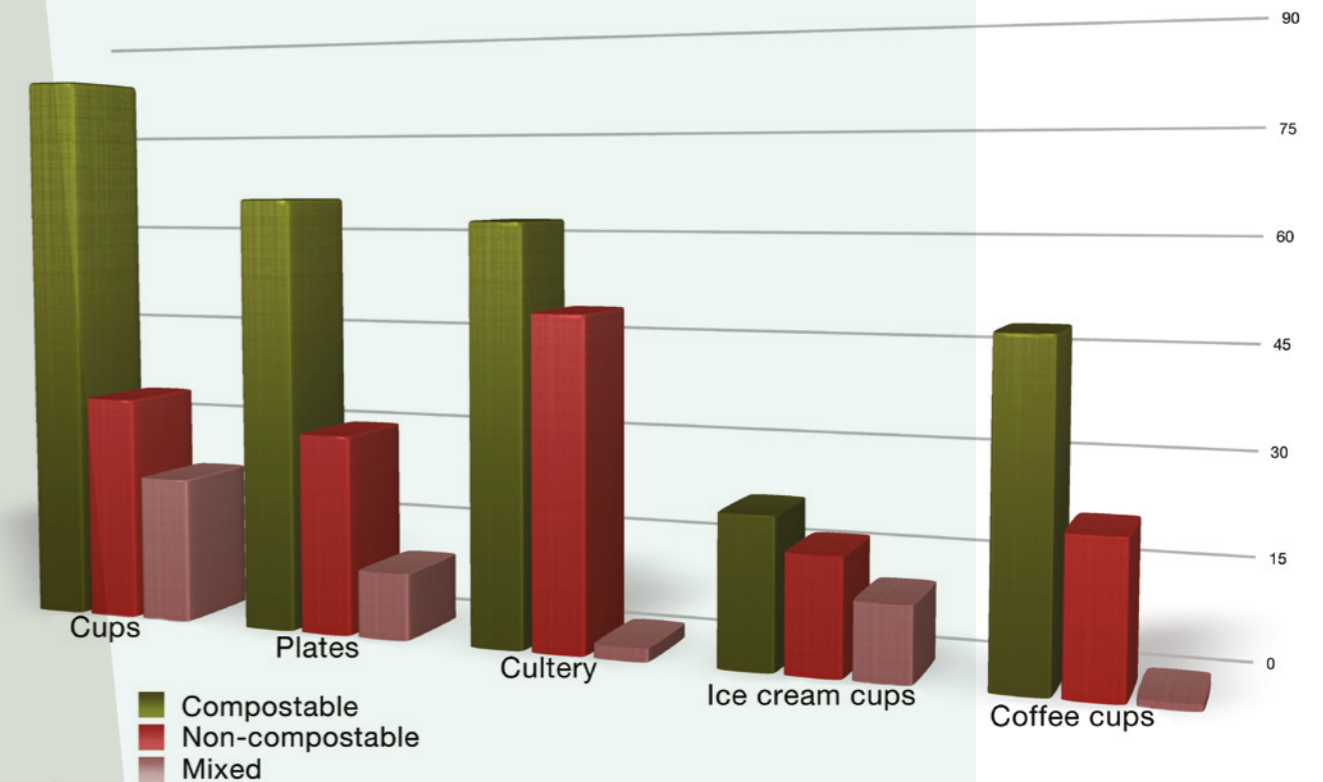


Figure 15

Therefore, even though the prevalent use of compostable disposable items was certainly a positive achievement, which definitely supported the effectiveness of actions carried out, the share of non-compostable disposable items was still relevant, especially in specific cases such as cutlery and ice-cream cups.

Catering operators summarised the most recurrent situations bringing to the lack of full compliance to the provision as follows:

- ✓ some Participants distributed precooked foods in the packaging (made of plastic or composite materials) that had also been used for their conservation and transportation;
- ✓ it was objectively hard to promptly find suitable materials for the specific product served and proceed to branding beforehand;
- ✓ some operators found it difficult to recognise certification marks or obtain the related guarantees from their suppliers;
- ✓ following the large visitor turnout in the final months, some Participants turned to new types of disposables, due to the running out of previous stocks of compostable items;
- ✓ with the approaching of the closing, almost all washable items were withdrawn and replaced with compostable and non-compostable disposable ones due to logistics and dismantling reasons.

In order to provide information support to visitors and clients, Expo 2015 issued a notice (see the image in the following page), in Italian and English, to indicate at each food outlet which containers were made of compostable and biodegradable materials. The notices were displayed in the most visible spots.

All considered, there was a certain amount of confusion concerning compostable and non-compostable materials. Furthermore, both visitors and staff encountered several difficulties in

<sup>66</sup> See chapter 2, page 39.

<sup>67</sup> One-shot events and catering areas modified or launched after the period concerned were excluded from the analysis (although they represented limited occurrences).

visually making out the difference between compostable and non-compostable polymers. Such issues could be overcome if, for example, there were a unique, international colour coding for the different types of packaging materials, and in particular to make a distinction between compostable and non-compostable ones: colours are more readily understandable than the various certifying labels.

**Organico**  
Organic | Bio

**Aiutaci a fare bene la raccolta differenziata dei rifiuti!**  
Questi materiali monouso sono **biodegradabili e compostabili**, in conformità allo standard UNI EN ISO 13432:2002 **devono essere messi con la raccolta dei rifiuti organici.**

**Help us do the separate collection!**  
These disposable products are **biodegradable and compostable**, in compliance with the UNI EN 13432:2002 standard rules **they can be disposed together with the organic separate collection.**

<p><input type="checkbox"/> <b>Piatti</b> Plates</p> <p><input type="checkbox"/> <b>Tazze</b> Cups</p> <p><input type="checkbox"/> <b>Posate</b> Cutlery</p> <p><input type="checkbox"/> <b>Coppette finger food</b> Finger food cups</p> <p><input type="checkbox"/> <b>Confezioni cibo d'asporto</b> Take away food boxes</p>	<p><input type="checkbox"/> <b>Bicchieri</b> Beakers</p> <p><input type="checkbox"/> <b>Coperchi per bicchiere</b> Beakers' lids</p> <p><input type="checkbox"/> <b>Coppette e palette gelato</b> Ice cream cups and spoons</p> <p><input type="checkbox"/> <b>Carta da banco</b> Food wrapping paper</p> <p><input type="checkbox"/> <b>Shopper e sacchi</b> Shopping bags and garbage</p>
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#### Recovery of unconsumed food

Expo 2015, together with Fondazione Bancoalimentare, put in place an unconsumed food recovery scheme that saw the involvement of several Participants.

The collection carried out by Fondazione Bancoalimentare was articulated in two different steps: the first pilot phase concerned the gathering of data on surplus at all food outlets, while the second one focused on experimental food recovery with a traditional van which was granted night access to the Site. After the first few days, food outlet owners and managers aligned purchases with visit trends, which meant that during Expo 2015 semester there was no reporting of great quantities of recoverable unsold items. After some months of more or less occasional or on-call recoveries, the collection of surplus entered into force with the installation of a refrigerated container and the use of a cargo bike facilitating widespread collection also for perishable products to be reused within a very short time.

Bancoalimentare directly contacted over 130 food outlets, more than 25 of which became stable donors and 87 declared they would be available to donate any occurring surplus. During Expo 2015 semester almost 50 tonnes of food were collected; with an average value of 2.9 euro/Kg calculated according to the recovered product type, they reached a total economic value of almost 150,000 euro. 14 charities benefited from the project. Out-of-pocket expenses amounted to 38,000 euro net of the activity of the volunteers involved.

Quantities might not seem high considering the needs of the most economically disadvantaged but they represented however a good result in the fight to waste; furthermore, thanks to the visibility given to such surplus, food outlet owners and managers got progressively organised in the best possible way to try and optimise purchases and procurement logistics.

Such initiative was paralleled by the recovery of Coop's about-to-expire and unsold products carried out by Caritas Ambrosiana, allowing the allocation of a further amount of food products to those in need.



3.3  
RESULTS  
HOW TO MAKE THE MOST OUT  
OF SELECTIVE WASTE COLLECTION

Based on preliminary investigation and the gradual confirmation of the operational standards on the Site, the various technical aspects of waste collection were analysed and the procedures of operation defined in detail together with service company AMSA.<sup>68</sup>

The adopted planning criteria were the following:

#### a) In order to involve the service company:

- ✓ monitoring of service quality through the constant presence on the Site of highly professional figures as coordinators and supervisors;
- ✓ remote control tools for collection vehicle GPS tracking, through which the service carried out and the passages of vehicles at served collection points could be certified;
- ✓ certification and filing of weighing operations by means of dedicated software<sup>69</sup> that allows to meet all waste-related regulatory obligations and management needs;
- ✓ selection and training of staff operating at Expo Milano 2015;
- ✓ detailed definition of operational procedures.

#### b) In order to optimise service and its performance:

- ✓ flexibility and re-planning/adapting of the service (in relation to the constantly evolving context) by means of weekly reporting and unbiased evaluations based on certified data and frequent technical meetings; the latter were important to constantly share considerations on the service provided and possible adjustments to be made.

<sup>68</sup> AMSA is a company of the A2A Group that has been dealing with soil hygiene services and selective waste collection for over 100 years, guaranteeing the correct recovery and management of collected material. AMSA was selected as service company on the area of the Event also considering that it held the service contract for waste management with the Municipality of Milan - Resolution of the Giunta Comunale (City Council) No. 1598 of 31/07/2014. [www.amsa.it](http://www.amsa.it)

<sup>69</sup> ECOS software.



Figure 16. The pedelec powered by photovoltaic panels.

### c) In order to engage with visitors and Participants:

- ✓ visibility given to cleaning operations and waste collection through the creation of a coordinated Expo 2015 image to communicate the message of selective waste collection: from event-specific uniform, clearly identifying staff on the Site with a worker's image of tidiness and decorum, to the layout of the on-site storage area and the dressing of collection vehicles, which were either electricity-powered, methane-powered or EURO 6 and rigorously eco-friendly; there also was a special pedelec powered by photovoltaic panels;
- ✓ direct accountability of users (Participants had been assigned their own waste disposal areas) and direct match between bins and users (a criterion that was generally applied, with the exception of some specific cases);
- ✓ publication of the guidelines for Participants (*Waste Management Guide - Sustainable Waste Management*, March 2015) to inform them about the details of Italian legislation and the management procedures set for waste collection from the areas allocated to Participants;
- ✓ production and distribution of multilingual informative materials to cleaning operators in exhibition and catering areas (in 6 languages, including Chinese, Arab and Russian).

### d) For bins allocated to visitors

AMSA and Expo 2015 collaborated to identify the best solution from a functional point of view applying the following criteria:

- ✓ functionality of bins to reach the set selective waste collection objectives; bins were modulated into 3 to 5 compartments for the different streams of recoverable materials: paper and cardboard, plastic and metal packaging, organic matter, glass and residual dry matter;
- ✓ maximal reduction of occupied space (130 litre per bin and 1-2 m<sup>2</sup> taken up at each collection point);
- ✓ prevention of any overflowing (total volume calculated according to the degree of filling and emptying frequency throughout the day);
- ✓ prevention concerning safety (stability, surfaces and edges, rigid bins for glass and organic matter) and security (allowing for a rapid content inspection);
- ✓ use of bin surfaces for educational pictogram notices on environmental themes and for providing precise indications on waste sorting (in Italian, English and French);
- ✓ positioning of collection points for maximum waste interception (proximity to potential large waste producers, including catering facilities and food & beverage points of sale, as well as most popular areas for visitors, such as gates and rest areas).

## CHASING BINS

Following a first phase of desk study for the positioning of waste bins, mapping all needs related to spaces and streams, the opening of the Event marked the beginning of field verification, based on points of greater waste production and on the convenience of collection operations. For example, since the very first days after the opening to the public, large 1,100-litre bins were provided to collect voluminous items and placed close to Participants producing high amounts of waste though having limited storage space.

The actual situation as well as daily-created maps were different every morning, causing paradoxical and amusing situations. The chase for bins which had been moved by Participants during the night according to their own needs – and never for the common good – was carried out with dedication by operators who spent 2-3 weeks to stabilise the situation and consolidate the correct and final location of bins.

Also depending on the events and initiatives hosted by Expo Milano 2015 during the semester of activity (e.g. Guinness World Record for the longest pizza, Ice Cream Festival etc.) bins were moved by operators based on needs.



Figure 17. Selective waste collection bins.

### Collection and cleaning services

The waste management service on the Site of Expo Milan 2015 during the Event was based on the model of the service contract in place with the Municipality of Milan (enhanced with an additional-frequency service – daily collection) and included:

- ✓ selective waste collection in common areas;
- ✓ maintaining of decorum during opening hours, both in ordinary conditions and during extraordinary events (Heads of State visits, Pizza Festival etc.);
- ✓ selective waste collection in areas pertaining to Participants;
- ✓ final removal of waste during closing times;
- ✓ sanitising and cleaning of selective waste collection bins;
- ✓ cleaning of green spaces and of perimeter waterways.

AMSA operated on the Exhibition Site 24/7, employing 161 staff operators (150,000 hours/man and 58 vehicles and equipment). Activities were divided into three time slots. From 6 a.m. until the opening to the public various services including cleaning and mechanical and manual sweeping of public areas were carried out; during the day operators were in charge of the standard cleaning and emptying of bins; at night door-to-door selective waste collection was carried out at pavilions. AMSA was provided with a waste depot at the outskirts of the Exhibition Site for the temporary storage of sorted waste collected on site, equipped with 4 electric solar-powered compactors and 4 large open-air containers.

### Event specificity and the 'learning curve'

It is important to underline the complexity of Expo Milano 2015 (or other similar mega-events) and the related contextual issues.

There was no resident population to intervene on with repeated messages and a progressive consolidation of behaviour, as it would have happened in the case of a city. The episodic nature of access to the Exhibition Site of visitors as well as Participants from over 138 different countries required facing a universe of actors mostly coming from environments with very different attitudes and operational traditions concerning waste collection (or, in most extreme cases, completely lacking structured systems for the collection and sorting of waste), which meant they had to learn the principles of selective waste collection only for the day of attendance on site or for the period of presence at the Exposition.

In addition, there was a significant turnover of staff employed by Participants for cleaning and waste management activities.

Concerning the 'learning curve' of the system and the flexible and constantly modified management following the evolution of the system itself (including the above-mentioned positioning of bins), selective waste collection benefited from the system of monitoring (supervision), signalling and prompt intervention developed by Expo 2015 at the offsite Command and Control Centre. The organisation of the system, named EC3 and shared with AMSA for what concerned waste management, guaranteed a timely and thorough action. Indeed, during the Expo 2015 semester there were 871 reported cases of non-compliance or behaviour anomalies related to waste management by Participants; such warnings, collected by field operators, were communicated to the Command and Control Centre, which took corrective measures. The latter included over 900 one-to-one meetings with the staff of restaurants and cleaning firms working on the Site to recall correct waste sorting procedures, as well as 90 training sessions for miscellaneous staff.

### Other organisational matters: Key words? Awareness raising, information and involvement

In accordance with the mission of the Universal Exposition, consisting in the dissemination of knowledge and education on the themes of food and sustainability, a series of communication, awareness-raising and involvement activities for visitors were planned and implemented.

Awareness raising meetings were organised for all Volunteers alternating on the Site every 15 days; in the framework of their activity of visitor involvement, Volunteers were invited to promote correct behaviour and help visitors understand the rules for proper waste sorting, with a specific focus on the difference between traditional plastic and bioplastic. Volunteers were joined by a group of workers from penitentiaries who, after attending a training course managed in collaboration with AMSA and CONAI,<sup>70</sup> spent their working day on site to involve visitors and assist them in proper waste sorting within the Exhibition Site.

Some of the informative and awareness-raising initiatives were carried out by CONAI as Supporter of Expo 2015 for Circular Economy. In particular:

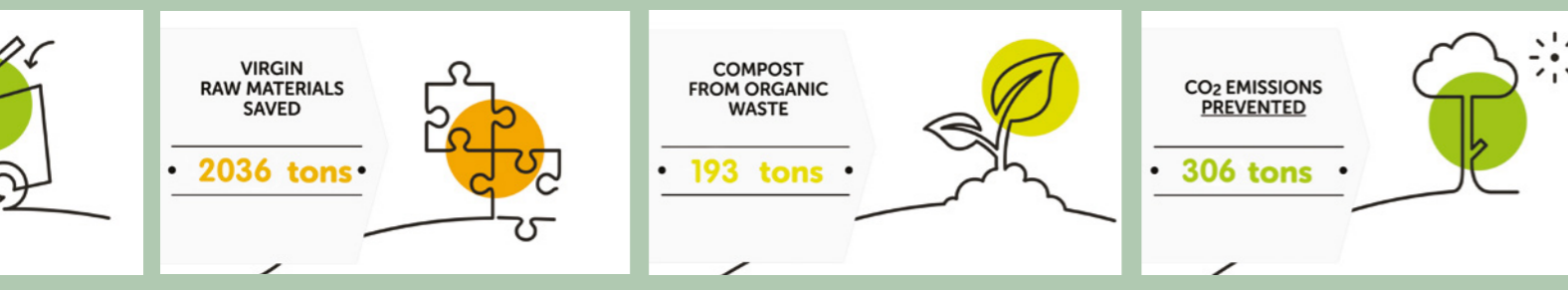
- ✓ 7 informative videos on the importance of selective collection of the various types of waste, as well as a video to thank the most active operators for selective waste collection. These 32-second videos, with both Italian and English texts, were looped on the 44 totems present on the Site for 10% of the daily available time;
- ✓ a video on the significant role of packaging and on its recyclability, displayed in a loop in the Children Park;
- ✓ the implementation of the Environmental Meter by CONAI and the relevant video constantly informing people on positive environmental effects of selective waste collection activities and of the recovery of packaging and other types of waste;
- ✓ the installation of 30 benches made of recycled packaging material to give a concrete and tangible example of what can be achieved through material recovery;
- ✓ the Recycling Tube, an installation providing visitors with an interactive tour showing the process undergone by packaging waste – steel, aluminium, paper, wood, glass and plastic – from selective waste collection to the transportation to processing plants and the transformation into secondary raw materials through recycling.

In particular, the Environmental Meter relied on a fortnightly update (based on the amount of selective waste collection carried out on the Exhibition Site) to measure main environmental-related performance indicators, including the absence of CO<sub>2</sub> emissions and savings on virgin raw materials, water and electricity. Furthermore, the quantities of saved virgin raw materials and the secondary products obtainable from recycled materials were also highlighted.

From the video on the correct waste disposal:



From the video on the Environmental Meter:



Finally, from mid-September on and with the collaboration of the two non-profit organisations Legambiente and Industria Scenica, the *Environmental education – Raising Visitors' Awareness on Selective Waste Collection* service was implemented, including performances and entertaining initiatives for visitors waiting to get in; the objective was to provide useful information and knowledge on the themes of selective waste collection and on the sorting and positive reuse of different materials. Every day at peak time, for about 1.5-2 hours, some groups took turns at the 4 gates of Expo Milano 2015 performing for about 5 minutes aiming at catching the attention of as many visitors as possible, and particularly the numerous visiting school groups.<sup>71</sup>



To complete the description of initiatives it is also worth quoting the production of a flyer/poster with the characters of mascot Foody, thought for children between 6 and 10 years of age, conveying messages on correct environmental behaviour with a focus on proper waste sorting. 15,000 copies were distributed, 10,000 of which on the Site during the Expo 2015 semester.



### The 184-day collection

Expo 2015's statement was that it wanted to outdo other similar, major international events by raising the target for selective waste collection to 70%. Although it was a rather challenging goal, given the characteristics of the Event, it was in line with the European legislation and policies for the sector, considered to be the most advanced scheme for waste management at the global level and hence accepted by the relevant supervisory authorities.

Furthermore, the objective was fully compliant with general environmental sustainability principles and with the messages the Event itself intended to disseminate, linked to the lead Theme *Feeding the Planet, Energy for Life*.

The overall production of municipal and similar waste by the Event amounted to ca. 6350 t, lower than project forecasts especially regarding organic waste. The main concurrent conditions determining such phenomenon can be identified as follows:

- ✓ the catering model chosen by several Operators, involving a large amount of off-site preparation processes and the delivery of ready products to the Site;
- ✓ the logistics model (limited storage capacity within pavilions or catering areas and access of supply vehicles only at night, with the exception of emergency situations and only allowing reduced quantities), setting that supplied quantities would be based on actual needs;
- ✓ the presence on site of initiatives for packaging production prevention, like public water houses to dispense mains drinking water and the recovery of unconsumed food;
- ✓ the growing habit of school groups and families to bring food from home, consequently reducing or eliminating waste from on-site preparation and consumption.

However, the ratio between total production and number of visitors provided a figure that was extremely variable throughout the duration of the Event, between ca. 0.25-0.3 kg/visitor and 1.3-1.5 kg/visitor.

EVENT	VISITORS	SPECIFIC PRODUCTION INDEX (kg/visitor)	SOURCE
BEIJING 2008 OLYMPIC GAMES	10,500,000	<b>0.670</b>	Independent Environmental Assessment Beijing2008 Olympic Games United Nations Environment Programme (UNEP) February 2009
EXPO 2010 SHANGAI	73,000,000	<b>0.328-0.504</b>	Shanghai EXPO 2010. UNEP Environmental Assessment, 2009. More info on the event official website: <a href="https://www.expo2010china.hu/index.phtml?module=hir&amp;ID=1-596">https://www.expo2010china.hu/index.phtml?module=hir&amp;ID=1-596</a>
2010 FIFA WORLD CUP SOUTH AFRICA	309,554	<b>5.190</b>	National Legacy Report for the Greening of the 2010 FIFA World Cup. Dept Environmental Affairs. Republic of South Africa
MONDIALI ANTIRAZZISTI OF CASALECCHIO	30,000	<b>0.319</b>	<a href="http://www.mondialiantirazzisti.org/new/?lang=en">http://www.mondialiantirazzisti.org/new/?lang=en</a>
WOODSTOCK 5 STELLE	141,600	<b>0.400</b>	<a href="http://www.reggio5stelle.it/2011/07/14/">http://www.reggio5stelle.it/2011/07/14/</a>
LONDON 2012 OLYMPIC GAMES	195,000	<b>0.342</b>	Environmental Statement for the London 2012 Equestrian and Modern Pentathlon events Greenwich Part; edited by 'London Organising Committee of the Olympic Games and Paralympic Games Ltd. November 2009
SALONE DEL GUSTO E TERRAMADRE 2012-2014	200,000	<b>0.760</b>	Scuola Agraria del Parco di Monza

Table 5. Comparison with specific waste production data at other events.

It is therefore impossible to define a univocal performance indicator, comparable to other similar events. Variation is too high and is a consequence of the many different types of food outlets (from finger food to self-service outlets, from cafés to restaurants) and the varying behaviour of visitors (number of meals per person at Event locations, consumption of free food at special events, consumption of own food).

Unfortunately, the other events chosen for comparison offer too different results possibly due to the different sources of the overall production figure (in some cases it only includes municipal waste, in others also similar and special waste, with or without sweeping dust).

Waste directly generated by visitors – that is, collected in multi-compartment bins – represented about 26% of total waste produced by the Event, considering that many visitors produced waste at the several facilities managed by catering operators (kiosks, cafés, restaurants, self-service outlets).

The 70% goal was reached at the end of July and basically maintained during the 3 following months until the closing. The Event ended up with an average of 67% selective waste collection.

Figure 18 reports on selective waste collection percentages per week. The chart also includes an interception line set on the 70% value, related to the objective imposed by EIA procedure regulations.

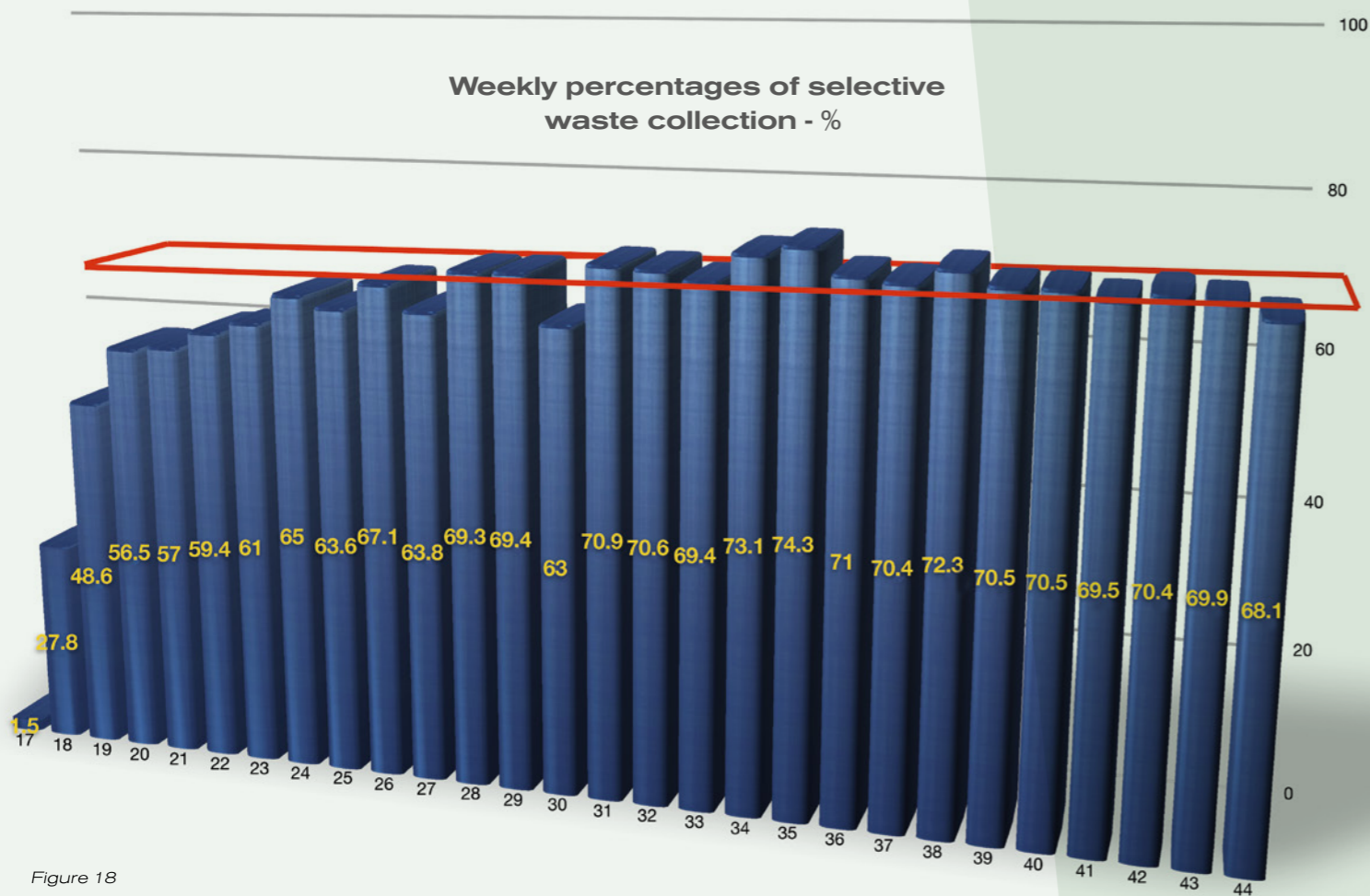


Figure 18

Figure 19 shows instead the details of the percent contribution of the different waste types sorted as well as of unsorted waste to the total amount of produced municipal waste (sweeping dust sent to recovery have to be added to these quantities).

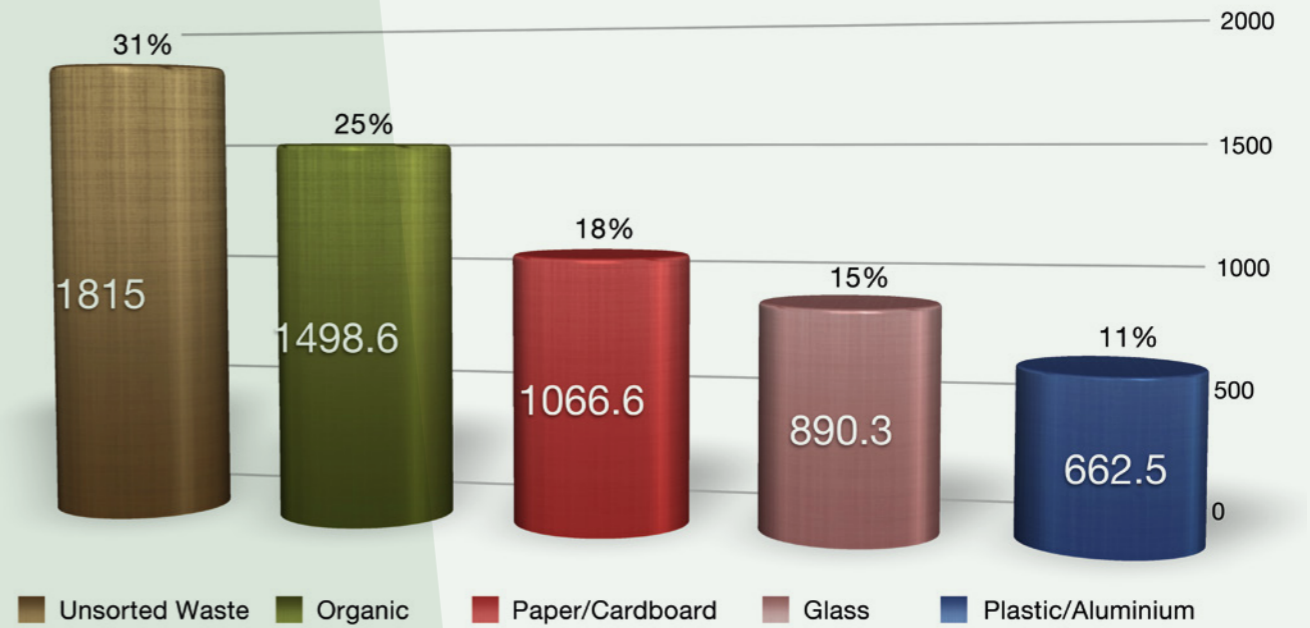


Figure 19

#### Destination of recovered materials

The identification of infrastructure and platforms to send collected waste to, was managed by AMSA also considering the relevant catchment areas and better logistics criteria with the aim to minimise the impact of transportation.

Destination plants for the different types of waste and distances from the Exhibition Site:

WASTE TYPE	DESTINATION AND DISTANCE (KM) FROM THE SITE TO THE TRANSFER STATION	FROM THE TRANSFER STATION TO THE DESTINATION PLANT
GLASS	A2A Ambiente - Asti - 16 km	122 km
PAPER	Italmaceri-DS Smith - Casarile (MI) - 16 km	22.7 km
LIGHT MULTI-MATERIALS	Masotina SpA - Corsico (MI) - 16 km	7.7 km
WOOD	SIMA SpA - Osnago (LC) - 16 km	46.4 km
ORGANIC	Montello SpA - Montello (BG) - 8 km	67.2 km
RESIDUAL DRY WASTE	Amsa Silla 2 - Milano - 8 km	0.9 km

Table 6.

In all cases the materials were accepted by the plants and addressed to actual recovery; issues arose (i.e. rise in inappropriate material percentages) only about the quality of light multi-material batches towards the end of the Event, when the high turnout of visitors lowered the performance of control on waste sorting.

To conclude, according to CONAI's Environmental Meter, selective waste collection and the transferral of resources for recycling allowed savings for 306 tonnes of CO<sub>2</sub>, 4.7 million kWh of electricity and over 50,517 m<sup>3</sup> of water.

The Meter was indeed created to quantify the avoided impact in comparison with unsorted waste landfilling, based on a model measuring the phases of collection, transportation, pre-treatment and recovery of waste. Based on LCA (Life Cycle Assessment) methodologies, it was implemented with data provided by AMSA and by the plants the different materials were sent to.

Quantities of material collected and sent to recycle also allowed to obtain secondary products. Here are some examples for each material:





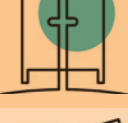



	244,196	fleece sweaters from PET plastic
	2,552	benches from other mixed plastic
	59,022	wrenches from steel packaging
	2,855	moka pots from aluminium
	2,545	wardrobes from wooden boxes
	over 6 MILLION	shoe boxes from paper and cardboard packaging
	almost 1,500,000	bottles from glass
	193t	compost from organic waste

Table 7

The thorough analysis of service costs does not allow for any comparison with other similar types in analogous situations, seen that in addition to the standard service further initiatives were carried out with the aim to guarantee the constant and accurate cleaning, maintenance of decorum and waste removal.

Such consideration would require an in-depth cost-benefit analysis, which goes beyond the scope of the current document. Expo Milano 2015 guaranteed maximum quality for an event of its type, which was fundamental for the image and reputation of the Event itself. The objectives of the Organising Company embraced the 'mission' of all Universal Expositions, that is, disseminating knowledge and good practices while also raising awareness among world population; this was acknowledged by visitors and Participants as one of the most distinctive elements of Expo 2015. Indeed, the results of the analyses carried out by GfK-Eurisko on behalf of Expo 2015 confirm the encouraging results obtained. Since GfK's first analysis in 2013 concerning the expectations for Expo 2015, 'the opportunity for an educational experience on the themes of nutrition and environmental sustainability' was indicated as primary reason for a potential visit by most people, both Italian and foreign. And at the end of the Event, when requested to make an assessment on the results of the Exposition, 61% of visitors stated that Expo 2015 had reached the objective of 'raising the awareness of people on sustainability themes' and 53% that it succeeded in 'improving daily behaviour of people (selective waste collection, food waste reduction, energy savings)'. This means that the coherence between the cultural mission of Expo - recalling the shared commitment for the safeguard of the planet - and the quality/sustainability of the management - considered excellent by most visitors - was certainly one of the crucial factors for the success of Expo Milano 2015, and can be seen as one of its most relevant legacies.



### 3.4 RECOMMENDATIONS FOR THE FUTURE

#### ✓ Adopt a policy for the prevention and management of waste

Formally adopt a policy and programme to allow all actors participating in the event in various positions to adapt their procurement processes aimed at controlling waste production, reusing goods and facilitating waste sorting and selective collection.

#### ✓ Plan in a detailed and timely way

Proceed by gradual implementation steps following the ongoing definition of operational choices (catering system, logistics, access, cleaning operations, security levels, programme of events etc.). Allocate adequate resources to guarantee not only cleaning operations but also the general decorum of the site, as well as the image and reputation of the event itself.

#### ✓ Carry out a cost-benefit analysis

Highlight the economic benefits (adding up to environmental ones) related to the maximising of selective waste collection and to the forwarding of materials for recovery.

#### ✓ Define operational criteria for waste management services

Elaborate clear service standards for the company in charge of waste management; such standards must be coherent and harmonised with other operational activities on site. Allow for appropriate monitoring, assessment of possible issue reporting and implementation of corrective actions.

#### ✓ Draw up guidelines for participants

Draw up reference guidelines listing the obligations of each participant as well as the management procedures to comply with. Provide maximum support to facilitate participants' compliance to set rules.

#### ✓ Guarantee service flexibility

Whenever possible, adapt the waste collection system to the actual needs of participants, situations generated by special events and changing operational conditions.

#### ✓ Allow for appropriate controls

Set up a system of accurate, on-site verification to supervise the activity of operators, report possible non-compliance and implement timely and precise corrective actions.

#### ✓ Exploit the communication potential of the event

Involve participants and visitors by communicating and sharing objectives, operational procedures and, above all, results that can be and have been achieved (including economic and environmental returns) thanks to individual and collective behaviours. Seize the opportunity to involve participants and visitors to disseminate knowledge and good practices, and to promote a greater awareness of one's own daily habits.







4  
CROSS-CUTTING  
INITIATIVES FOR  
A MORE SUSTAINABLE  
EVENT

The environmental sustainability path created for Expo Milano 2015 has resulted in a mosaic of initiatives and solutions complementing each other and perfectly in line with the main objective of any Universal Exposition: disseminating knowledge and educating the public.

Going even further, it represents a model to be replicated, improved and exceeded, as it leaves behind a legacy for the organisation and management of international mega-events to come. Such mosaic includes tools for sustainability management, carbon management, LEED criteria and *ad hoc* programmes created for the Exposition of Milan (*Towards a Sustainable Expo, Partake*): each of these 'tiles' bears its own significance in the final sustainability evaluation of the mega-event.



## 4.1 MANAGEMENT TOOLS

Sustainability choices were based on a series of management tools, selected and developed considering potential environmental and social impacts within three different dimensions:

### Organisation:

processes and activities directly carried out and controlled by Expo 2015;

### Event:

processes and activities emerging from the interaction between Expo 2015, as the Organiser, and Participants involved at the different levels;

### Context:

processes and activities within the framework of Expo 2015 but only indirectly attributable to the action of Expo 2015 and on which the Company did not exert any control or influence.

Here below is a brief summary of the activities carried out.

### The Charter of Values:

this was a fundamental document for the entire organisation of the Universal Exposition. Indeed, the Charter identified the principles followed by Expo 2015 in fulfilling its mission. Such guiding elements were defined after a constructive debate with stakeholders involved in their different roles in the preparation and implementation of the Event.

### Sustainability Management System for the Event:

in order to manage a series of potential environmental, social and economic impacts in a coherent and integrated way, international regulation *ISO 20121: 2012, Event sustainability management systems - Requirements with guidance for use* (officially issued only in 2013) was adopted. Thanks to its specificity on event organisation and the recent implementation experience of London 2012 Olympic Games, it enabled Expo 2015 to follow a single standard rather than the several previous ones - i.e. *ISO 14001, EMAS Regulation, Social Accountability 8000 (SA 8000) and Occupational Health and Safety Assessment Series 18001 (OHSAS 18001)* - each covering a specific environmental and social aspect.

In order to guarantee effectiveness and efficiency action, the management system was:

- ✓ integrated with key operations for the development of correct behaviour related to the awareness and culture of the organisation - this was achieved through close collaboration between different organisational units;
- ✓ clear, simple and functional, characterised by stripped-down documentation to avoid duplication;
- ✓ focused on the respect of legislation and on the best performances of significant environmental and social aspects;
- ✓ based on the involvement of stakeholders.

The Certification of compliance to ISO 20121:2012 international standard was obtained by Expo 2015 for its Event Sustainability Management System first in December 2014, for the preparatory phase, and then in July 2015, for the event phase (DNV GL third-party certification body).

It was the first ever Organisation of a Universal Exposition and the second internationally relevant mega-event, after the above-mentioned London 2012 Olympic Games, to develop a formalised and recognisable system of analysis and management of sustainability themes.

### The Sustainability Report:

between 2013 and 2015 the Sustainability Report was annually published to describe the green path followed by Expo 2015 before and during the Event, documenting all the commitments, efforts and resources brought to the table, as well as the results obtained by the economic, environmental and social performances. This accurate report, available in both printed (English) and online versions (English and Italian), was elaborated according to the *Global Reporting Initiative (GRI-G4)* international guidelines, integrated with specific ones for the sector of events. It was published in the preparatory phase in 2013, in the approaching phase in 2014, and in the Event management phase in 2015. The latter version was issued during the final month of Expo 2015 semester and included all data gathered up until then, projected on the entire period, in order to make the most out of the great interest raised during the final phase and be able to disseminate the results in the most effective way.

An external verification of the report was not considered appropriate (as recommended by the GRI itself) since the temporary nature of Expo 2015 and the rapid evolution of the design, construction, planning, event management and dismantling phases did not allow to develop a structured system for collecting data. Nevertheless, performance indicators followed reliable internal collection and verification procedures, under the constant responsibility of the management units in charge of the processes involved.

The Bureau International des Expositions made the following comments on the Report: "This document contains many valuable data, is to be considered as part of the working process and documentation for the legacy of the event and the report to the Government and Italian authorities. We recommend that you continue elaborating it and further define the potential recipients of this document. It is the result of a great effort and important work that provides valuable information and we wish to acknowledge this."

## 4.2 CARBON MANAGEMENT

Expo 2015 undertook the commitment to limit, quantify and offset carbon emissions from Expo Milano 2015 Universal Exposition.

In the framework of its sustainability strategy, Expo 2015 introduced design criteria especially aimed at limiting energy needs. Among the measures to contain emissions, the following can be synthetically enumerated:

- ✓ the construction of permanent buildings (Cascina Triulza, Palazzo Italia and Open Air Theatre) based on criteria aiming to improve performances in terms of energy efficiency, and the installation of LED lighting for the outdoors;
- ✓ the creation of a Digital Smart City on the Exhibition Site by making the most of smart technologies (first and foremost for TLC, electricity distribution and mobility), thus creating an area with high environmental performances – data reported in the Smartainability study, carried out by RSE\_GSE, estimated carbon emissions during Expo 2015 semester lower by 21,000 t than with traditional technologies;
- ✓ the purchase of green electricity entirely obtained from renewable sources with a guaranteed origin to meet the energy needs during the whole semester;
- ✓ the implementation of a programme for goods reuse at the end of the Event (set-ups, furniture, waste bins etc.) and for maximising the recycling of building materials and non-reusable goods.

In order to quantify the emissions produced by the preparation of the Site and the management of the Event, an Inventory of emissions following ISO 14064:2006 standard was created and updated throughout the development of the project since 2012. Inventories for operating years 2012, 2013 and 2014 were certified in October 2015 by a third-party, who acknowledged their compliance.<sup>72</sup> The 2015-16 Inventory, which regards the Event phase and also covers the Site dismantling phase, is being certified at the moment of publication of the current manual. In this respect too, Expo Milano 2015 has been the first mega-event to develop an Inventory with a recognised methodology including direct and indirect emissions.

Expo 2015 defined an emission offsetting plan shared with the Italian Ministry for the Environment and implying two types of intervention: a) contributing to local emission reduction projects on the territories

<sup>72</sup> DNV GL third-party certification body.

of Milan, Rho and Arese with no less than 2.5 million euros for initiatives directly managed by city councils; b) resorting to the purchase of carbon credits that would be validated, verified and registered according to international best practices.

The purchase of carbon credits was carried out in 2015, for a total of 279,000 credits (offsetting an equivalent number of tCO<sub>2</sub> eq) generated by 11 projects certified by recognised standards and chosen according to a reliable carbon offsetting strategy, coherent with the sustainability policy and the themes of the Exposition of Milan.

Expo 2015 released an international call for tender aimed at the acquisition of carbon credits on the voluntary market – a rather innovative procedure for the public sector – imposing strict selection criteria on suppliers to ensure high levels of quality and transparency; a specific framework for the quality of carbon credits to be acquired was created based on transparent and recognised methodologies in order to ensure a real, measured, verified and recorded reduction in carbon emissions by the selected projects.

More specifically, the criteria included:

- ✓ project certification following recognised standards: CDM<sup>73</sup>, Gold Standard,<sup>74</sup> VCS<sup>75</sup> additional standards like Social Carbon and CCB,<sup>76</sup> in compliance with the good practices code of ICROA<sup>77</sup>, international reference body for emission offsetting;
- ✓ carbon credits already generated during the period 2010-2014 and verified by external auditors, clearly traceable on online External Registries<sup>78</sup> for voluntary carbon offsetting;
- ✓ origin from countries included in the *Expo Milano 2015 Assistance Programme*, therefore contributing to initiatives for sustainable development in countries that are more vulnerable to the climate change effects;
- ✓ projects developed following specific methodologies approved by recognised standards and pertaining to the Theme, such as the spreading of efficient stoves for cooking, the safeguard of territory and biodiversity, the access to drinking water and energy, energy security;
- ✓ project diversity, ensured by limiting the amount of credits per project to 40,000 t CO<sub>2</sub> eq in order to obtain a large and diversified impact.

<sup>73</sup> The framework of the international market for carbon credits is characterised by two main systems: the system regulated by the Kyoto Protocol and the voluntary market. The former was established at Community level with Directive 2003/87/EC on the Emissions Trading Scheme (ETS) as main measure adopted by the European Union to fulfil the commitments of the Kyoto Protocol. Within this system, the most important accreditation scheme is represented by CERs (Certified Emission Reductions): emission credits generated by projects implemented in developing countries in the framework of the Clean Development Mechanism (CDM) included in the Kyoto Protocol. The voluntary market, on the other hand, has created a global market for voluntary carbon credits (VERs – Verified Emission Reductions). In order to ensure the reliability of the whole system, in the past few years the voluntary market has also set certification standards.

<sup>74</sup> GS (Gold Standard): certification standard from the Gold Standard Foundation applicable to Clean Development Mechanism (CDM) projects or other projects for the voluntary emissions reduction meeting strict requirements.

<sup>75</sup> VCS (Verified Carbon Standard): international standard for the voluntary certification of carbon credits managed by VCS (independent non-profit organisation).

<sup>76</sup> SC (Social Carbon) is a standard developed by the Ecological Institute certifying projects for the reduction of GHG emissions considering their contribution in terms of sustainable development. CCBS (Climate, Community and Biodiversity Standards) are developed by the Climate Community and Biodiversity Alliance, evaluating the projects for soil management from the early development and planning phases until implementation.

<sup>77</sup> <http://www.icroa.org/>

<sup>78</sup> Credit registries are databases publicly monitoring the issuing, exchange and withdrawal of carbon credits, thus ensuring transparency and traceability.

Following the call for tender, Expo 2015 awarded the management of the operation to EcoAct<sup>79</sup>, a world leader with great experience in the sector that used its account on the Markit external registry.<sup>80</sup> On top of reducing emissions, the 11 projects entailed several extra benefits to improve life conditions of local populations in several vulnerable countries:

- ✓ in Peru, Kenya, Bolivia and Brazil the projects brought to stopping deforestation (although partially) and safeguarding biodiversity;
- ✓ in Cambodia, Honduras, Zambia and Uganda the projects introduced the use of efficient cooking stoves reducing the employment of biomass, with important impacts on the health of consumers;
- ✓ in Cambodia and Kenya the projects guaranteed access to drinking water for rural families, and in Turkey they promoted the use of renewable energy instead of fossil fuels.



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Since the registration phase of the Event, Expo 2015 undertook the commitment to refer to the most advanced criteria for the development of residential areas and the construction of buildings, in particular the U.S. LEED (*Leadership in Energy and Environmental Design*)<sup>81</sup> system.

In the case of the Exhibition Site, Expo 2015 requested a periodic assessment of the quality of the sustainable solutions adopted for design and construction. In particular, the infrastructure plan of the Site was subjected to independent verification by a third-party (an ICM-accredited certification body) which provided an assessment of the overall degree of implementation of the *LEED 2009 for Neighborhood Development* (ND) protocol.

The LEED 2009 protocol promotes an integrated planning system that takes into account the different elements of a neighbourhood (healthiness, safety and sustainability), focusing on the choice of the site and the performance of buildings and infrastructure, with the final goal of creating a homogeneous neighbourhood interrelated with the landscape. More in detail, it concerns the reduction of the heat island effect, the materials employed, new tree planting, connection infrastructure and the development of sustainable mobility, the reduction of drinking water consumption and the harvesting of rainwater, the design of highly energy-efficient permanent buildings and a more sustainable management of construction sites.

Expo 2015 decided not to follow an actual certification path because the Protocol could have only partially been applied, given the peculiarities of the exhibition non-residential area, the temporary nature of buildings and the complexities of the construction site (3.5 years of ongoing works, 9,500 businesses involved, with a workforce reaching 10,000 people). Verification actions were taken according to the development of the project: in 2013 (final design/executive phases), in 2014 (construction and project modification phase) and 2015 (operative phase following the completion of the project).

<sup>79</sup> <http://www.eco-act.com/>

<sup>80</sup> The registry makes the withdrawal of credits visible on the internet in a transparent manner and ensures the uniqueness and veracity of the emission offsetting accordingly carried out. Acquired carbon credits were therefore issued, withdrawn and cancelled by EcoAct on behalf of Expo 2015 using its own account on the Markit external registry.

<sup>81</sup> The LEED system is developed by the United States Green Building Council (US GBC) and is increasingly recognised at the international level. It is widely applied in 140 countries; in Italy it is promoted by the GBC Italia association. LEED is adopted on a voluntary basis and the process of certification by a third party validates the design, construction and management of sustainable buildings and high-performance territorial areas.

The conclusions by the ICMQ certification body are: "the expected final certification level is 'Certified' (expressing minimum adequacy, the higher levels being Silver, Gold and Platinum). The value of the project lies particularly in: the intrinsic characteristics of the site and its closeness to services and public transport; the primary (underground and railway stations) and secondary (buses, shuttles, car sharing, bicycle and car parking facilities) infrastructure services that reduced and facilitated the reception of the considerable traffic flow generated by visitors; the care put in the planning of green areas, from planning their sizes and locations within the exhibition site to the selection of plants and areas specifically designed to be freely used by visitors (play, leisure, relax, picnic).

Finally, it must be highlighted that reaching the 'Certified' level is the result of the significant effort made by Expo 2015 to not only design any construction under their responsibility in a sustainable way, but also to guide Participants with specific guidelines and restrictions. Such commitment to coordinated work and periodic verification during the design and construction phases was therefore essential to the successful experimental application of the ND LEED protocol to the Exhibition Site".

## LEED PLATINUM CERTIFICATION FOR CASCINA TRIULZA

Cascina Triulza, a late-19th-century rural building from the Lombard tradition, originally conceived for the everyday life and activities of farmers, became an important permanent and symbolic building within the Exhibition Site. It was restored by Expo 2015 based on sustainability criteria in compliance with the LEED NC (*Leadership in Energy and Environmental Design - New Construction*) standard, obtaining the Platinum-level certification, recognised by U.S. GBC, in September 2015. Compared to a traditional building of the same size with standard installations and equipment, it achieved:

- ✓ about 50% drinking water savings;
- ✓ 76% electricity savings ;
- ✓ 70% of the wood used for construction was FSC (*Forest Stewardship Council*) certified and sourced from sustainably managed forests.

Furthermore:

- ✓ 50% savings on water for sewage;
- ✓ 64% of electricity needs potentially covered by a photovoltaic system.

With regard to social commitment, Cascina Triulza was the perfect meeting point for Civil Society Organisations wishing to be permanently present on the Site, and it provided a warm welcome and high-quality services for visitors (mobility, areas for families and children etc.).

It was managed by Fondazione Triulza, a network of 63 nationally and internationally renowned non-profit organisations, which created a very broad cultural programme for the semester of Expo 2015, including 750 events that brought together 140 organisations, producers and exhibitors.

### 4.4 TOWARDS A SUSTAINABLE EXPO PROGRAMME

Towards a Sustainable Expo was the voluntary programme aimed at Expo Milano 2015 Participants. The initiative, promoted by the Italian Ministry for the Environment and Expo 2015, had the objective to raise further awareness on sustainability needs and to promote a greater attention towards voluntary initiatives that contributed to make of the Exposition of Milan a more sustainable event. The programme received the scientific contribution and technical support of Politecnico di Milano and IEFE Bocconi.

*Towards a Sustainable Expo* fostered a 'competition' between Participants based on the sustainability initiatives and solutions they adopted on the different grounds, grouped into 4 categories:

- ✓ **sustainable architecture** (*Design & Materials*), related to pavilions design;
- ✓ **sustainable food** (*Food & Beverage*) provided by food outlets and catering services;
- ✓ the application of **green procurement** criteria for furniture, packaging, merchandising products and the organisation of events both within and outside the Exhibition Site;
- ✓ **other initiatives** or specific projects on environmental and sustainability themes that could not be classified in the other three categories (e.g. carbon footprint assessment, carbon offsetting, initiatives promoting waste collection, fair trade products etc.).

On the occasion of the Universal Exposition – which focused precisely on sustainability themes and on the search for food production tools that are more efficient and at the same time more respectful of natural resources – it was important to encourage the commitment of all actors to minimise the environmental impact of their participation in Expo 2015, while highlighting the most significant sustainable solutions and good practices put in place as a legacy for the future.

The initiative was aimed at all Participants, both countries and corporates: those who signed up obtained the 'Player - Towards a Sustainable Expo' title, and were awarded a plaque to be displayed at the entrance of each Pavilion to highlight their participation and contribution, be it big or small, to the sustainability of the Event. In order to take part in the programme, each Player had to fill in an application form with technical details to allow an evaluation of their environmental performance. A total of 79 candidatures from the four categories were received for an overall participation of 39 Players (23 countries e 16 partners and Civil Society Organisations).

CATEGORIES	PARTICIPANTS	COUNTRIES	CORPORATES & CIVIL SOCIETY ORGANISATIONS
DESIGN & MATERIAL	32	21	11
FOOD & BEVERAGE	12	6	6
GREEN PROCUREMENT	14	4	10
OTHER INITIATIVES	21	10	11
TOT	79	41	38

Table 8

From an organisational point of view, Programme Regulations, a Technical Secretariat and a Jury of national and international experts were established. Researchers from IFE Bocconi and Politecnico di Milano supported the Italian Ministry for the Environment and Expo 2015 in analysing the documents produced; they then carried out visits and audits at Players' pavilions to verify adopted solutions on the field. For each of the four categories Leader Pavilions<sup>82</sup> (3 countries and 3 corporates) were identified and awarded distinction plaques.

For the sustainable architecture category 6 aspects were taken into account (each including further evaluation parameters for a total of 23) linked to pavilion construction procedures, efficient technologies employed and environmental performance:

- ✓ adoption of energy-saving **cooling** technologies (e.g. envelope solutions or shading and screening systems to control and minimise solar heat gain, ventilated façades, green roofs and walls, free-cooling and natural ventilation systems);
- ✓ **reuse** of pavilions after the event and/or recycling of building materials;
- ✓ use of **recycled** (or certified) **materials** for pavilions (especially wood that had been recycled or coming from certified and verified supply chains guaranteeing that the material was sourced from sustainably managed forests (*FSC-Forest Stewardship Council* or *PEFC-Programme for Endorsement of Forest Certification schemes*));
- ✓ use of energy-saving **lighting** solutions (e.g. LED and CFL lamps, presence detectors and BMS-Building Management Systems for monitoring and controlling building features);
- ✓ installation of systems to produce **energy from renewable sources**;
- ✓ implementation of technical solutions for **water saving** (e.g. diffusors, flow reducers, energy-efficient irrigation systems, tanks for the harvesting of rainwater).

For the final scoring, each aspect had a different importance based on the relative impact on overall sustainability. The management of the end of life of pavilions, undoubtedly representing the main environmental pressure, was considered as particularly significant and attributed almost half of the total score for the sustainable architecture category. The choice was therefore made to favour Participants who had been able to define the post-event reuse of pavilions in advance: reuse – as described in chapter 1 – represents indeed the most sustainable alternative to landfilling of used materials or to demolition.

For the category of sustainable food and catering services, several parameters (17 in total) were also considered including: offering food sourced from organic agriculture and aquaculture and from integrated production systems, use of eco-friendly products (with certifications such as European Ecolabel for premises cleaning products), use of little or recycled packaging, employment of biodegradable crockery and better energy-performing equipment (e.g. ovens, refrigerators), implementation of informative campaigns for clients (e.g. information on the characteristics, territorial origins and environmental impacts of food on offer) and training sessions for employees on the sustainability of products etc.

For the third category (green procurement for furniture, packaging, merchandising products etc.) 46 parameters were taken into consideration, among which: the origin of wooden and wood-based materials used for set-ups and furniture, the percentage of recycled materials in wood, metal or glass-based items making up set-ups, the composition of products employed for surface coatings (e.g. paint products) as well as of stickers and glues, the sustainability of materials used for merchandising items (e.g. organic cotton for textiles) etc.

For both categories, award criteria were based on indications contained in the *Expo 2015 Green Procurement Guidelines*.<sup>83</sup>

Finally, the last category provided Participants with the opportunity to highlight any other implemented initiative or project based on environmental and sustainability themes that was not included in the previous categories, for example: dissemination through awareness, education and involvement campaigns for visitors; initiatives to promote selective waste collection, assess the carbon footprint of products and services on offer or implement carbon offsetting.

In order to give visibility to the Programme, and consequently to the sustainability themes related to it, two events were organised within the Exposition Site: the first was the launch of the initiative, held on 5 June 2015 on the occasion of World Environment Day, while the second one, on 1 October 2015, was the final ceremony to award Leaders. Both events were attended by Gian Luca Galletti, Minister for the Environment, Land and Sea; Giuseppe Sala, Commissioner for Expo 2015; Achim Steiner, UNEP Executive Director; and Jan Dusik, Director of UNEP Regional Office for Europe.

For further information please refer to chapters 1 and 2, which include an analysis of the results as well as the good practices emerged from the programme.



Partake was a dissemination, communication and participation project linked to the experience of Expo Milano 2015 which focused on the themes of sustainability, food security and climate change. Partake was promoted by the Italian Ministry for the Environment together with Expo 2015 and supported for technical and scientific matters by Politecnico di Milano (Department of Energy). Its objective was to raise public awareness on the core themes of the Universal Exposition, with a specific focus on mega-event sustainability and the impact of climate change on food security.

The project included several communication tools based on the 'partake' concept; the main point of reference was the <http://www.partake.minambiente.it> website, also featuring an English version (<http://www.partake.minambiente.it/en/>).

True to the leading Theme of the Expo, Partake developed a series of initiatives and tools aimed at explaining to the public in a simple and interactive way what climate change is, what impact it has on food production and which are the consequences for developing countries – affected more than others – but also for the rest of the world. Climate change and food security are indeed strictly interlinked: on the one hand, a growing demand for food contributes to climate change, on the other, the consequences of some climate change are at the base of food scarcity in various parts of the world.

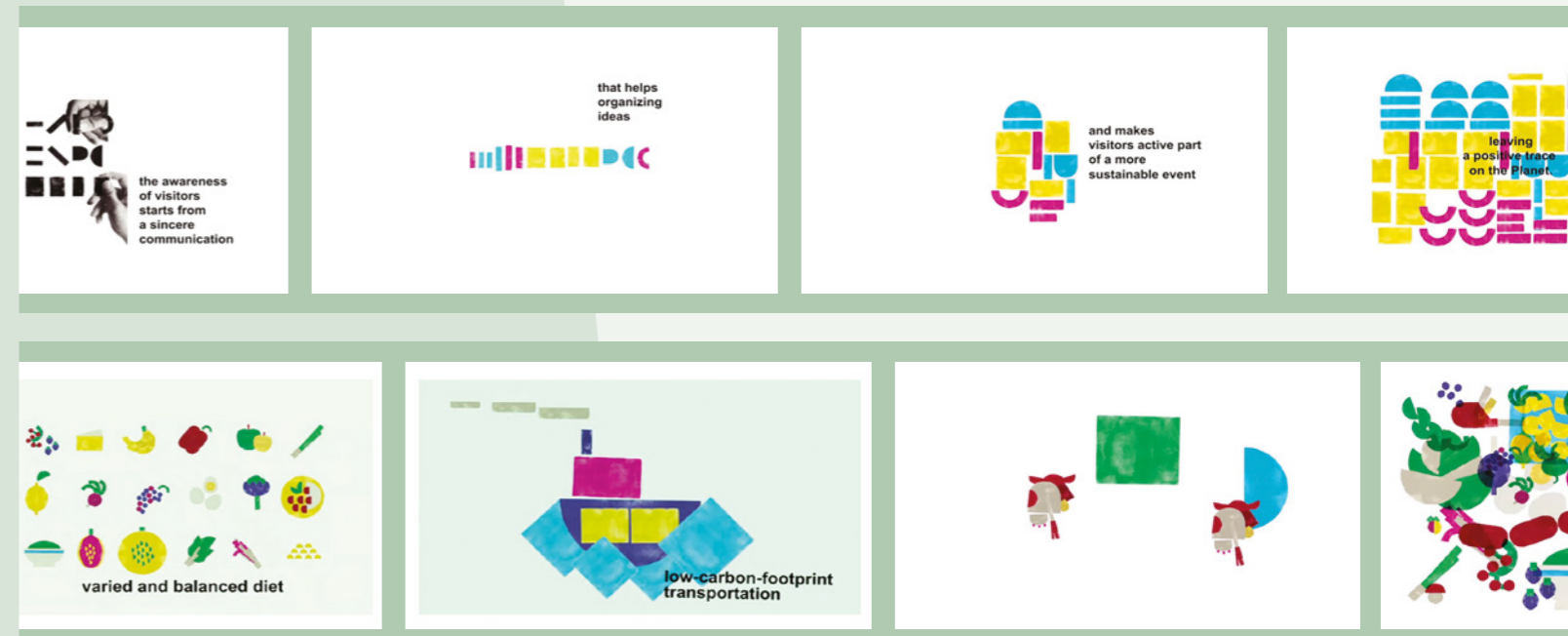
Partake put a focus on food carbon footprint, which 'measures' the impact of human nutrition in terms of climate-altering gas emissions. It analysed and explained about the impact of the different diets and the effects of the various production phases (cultivation, processing, packaging, cooling, transportation) on the carbon footprint value.

Mega-event sustainability was another central theme of the project, highlighting the possible impacts of events like Universal Expositions and presenting the tools implemented by Expo Milano 2015 to try and make the exhibition more sustainable.

Specific communication tools and initiatives for both the public and the experts from the sector were put in place to make the project contents known. In addition to the website, these included:

- ✓ the Partake app, for both Android e Apple devices, showing how to reduce one's own carbon footprint and explaining about the impact of food production and one's dietary choices on CO<sub>2</sub> emissions. The app, featuring explanations and participatory games, is made up of 4 sections: climate change, carbon footprint of food, Ecolabel, food waste and selective waste collection;
- ✓ the Partake Handbook, a printable guide on the carbon footprint of food, showing what food items contribute the most to the production of greenhouse gases;
- ✓ five videos explaining the concepts of carbon footprint and climate change;
- ✓ a wall panel with graphs summarising all project themes, which was displayed on several occasions during Expo Milano 2015 and will be permanently placed at the Department of Civil and Environmental Engineering of Politecnico di Milano.

From Partake videos:



4.5  
PARTAKE PROJECT:  
PARTICIPATING AND  
COMMUNICATING SUSTAINABILITY

Among the main initiatives put in place, the following are particularly worth mentioning: the *Workshop on the relation between climate change, agriculture and food security in developing countries* and the set-up of a Solar Kiosk to exhibit prototypes of solar technologies, powered exclusively by photovoltaic panels and intended for the conservation and processing of agri-food products.

The *Workshop on the relation between climate change, agriculture and food security in developing countries* was organised by the Italian Ministry for the Environment and Politecnico di Milano (in collaboration with Università Cattolica del Sacro Cuore - UCSC ExpoLAB and with the support of Expo Milano 2015) and was attended by more than 70 people including experts from national and international institutions, universities, NGOs and private businesses.

The workshop focused on the following themes:

- ✓ impacts of climate change and possible actions to take to better adapt and be more resilient to climate change;
- ✓ best practices of mitigation in the agriculture and agri-food sectors of developing countries;
- ✓ carbon emission credits markets in developing countries and use of fair trade channels.

The event also featured the presentation of projects, most innovative technologies and most effective approaches to reduce carbon emissions in the agri-food and rural development industries, which would be applicable in countries that are most vulnerable from a food security point of view. Good practices had been previously selected through a call for Italian NGOs.

The Solar Kiosk was designed and set up by Politecnico di Milano, who decided to use installations, exhibitions, videos and informative material to raise awareness on themes related to climate change and food security, the carbon footprint of food and the use of innovative and sustainable technologies for agri-food production. Photovoltaic panels were installed on the roofing of the kiosk, making the structure completely self-sufficient (i.e. not connected to the electric network) in the production of the energy needed for the functioning of machinery and installations. Prototypes of solar technologies were realised and displayed, all exclusively powered by photovoltaic panels and water/air thermal collectors and meant for the conservation and processing of agri-food products: a solar-collector pasteuriser, an ice machine, a solar-collector dryer, another self-built solar-collector dryer and a few self-built solar ovens.



The construction of the Exhibition Site represented a challenge on sustainability for resource use and impact on the territory. Special attention was paid to the design and actual construction phases, as well as to the identification of innovative measures for compensating the loss of ecological value of the areas undergoing soil use change for the creation of the Site. Some significant elements are reported here below.

### Greenery

About **20% of the Exhibition Site** was covered with vegetation: 250,000 m<sup>2</sup> planted with 12,000 trees, 2,000 of which were fruit trees such as mulberry, apple, plum and apricot trees, 85,000 shrubs, 107,000 aquatic plants and 150,000 herbaceous plants. There were more than **250 different indigenous species** overall, safeguarding biodiversity. The project was developed to create a mix of natural and landscaped models, balancing nature and rigour, sustainability and production, function and appearance.

A series of initiatives aimed at recovering pot plants and particularly sensitive ones are currently being carried out.

### Water

The canal flowing around the perimeter of the Site was part of the 'Vie d'Acqua' (Waterways) project: a series of interventions aimed at enhancing the landscape and environment of open spaces within Milan's western belt, historical springs and the local waterways network.

The canal supplied water (less valuable than drinkable water) for cooling systems, also fed by 4 double wells for the collection of groundwater and for the irrigation of green areas. Within the Site technological solutions were also adopted - e.g. flow reducers, diffusors and timers to reduce water consumption, with **savings up to 50%** compared to traditional systems.

Finally, **11 phytopurification tanks** were installed on the Site - covering a total area of 9,000 m<sup>2</sup> - to purify first rain surface water.



## Smart technologies

The Smartainability project assessed the sustainability level (environmental, economic, energy and social benefits) of innovative smart technologies implemented by technological partners on the Exposition Site as compared with conventional situations. The estimated savings compared to a traditional project amounted to:

- ✓ **90,000 MWh** of primary energy from fossil source,
- ✓ **21,000 t** of CO<sub>2</sub>, **36 t** of nitrogen oxides, **62 t** of sulphur dioxide, over **5,000 kg** of particulate matter, more than 4,000 kg of which of the fine type;
- ✓ **6 million** euros deriving from reduced material and maintenance costs.

## Electricity and lighting

- ✓ During the six months of Expo Milano 2015, **47 GWh** of electricity were consumed (EIA estimate was 105), **100%** of which were **green**, i.e. derived from renewable energy sources of certified origin.

As for lighting, and in particular external pavilion lighting, highly energy-efficient outdoor LED lights were selected as early as the design phase enabling considerable savings.

## Mobility

A specific focus was put on visitors' mobility, so that they could reach the 4 gates of the Site by local public transport: underground, tram and trains, which also stopped at Rho Fiera Expo Milano 2015 station for the whole duration of the event. Official data released by public transport operators highlighted that the majority of visitors (ca. 60%) had a preference for public transport.

It was also possible to reach the Site by bicycle, bus or private means of transport; there was a free shuttle service from the nearby car parks.

For on-site transfers, a shuttle bus service (People Mover) with hybrid multi-fuel (petrol and methane) vehicles was put in place.

## Logistics

The logistics system of the Site was conceived to put together procurement, security and environmental sustainability needs. Over 40,000 vehicles entered the Site for deliveries and maintenance, with a means of about 215 vehicles/day and more than 400 in peak days. Some significant elements were: more than 98% of deliveries were carried out during the night, without therefore having any impact on day vehicular traffic; promotion of the use of eco-friendly vehicles (Euro 5 or superior classes, electrical, bio-fuel powered); 10% of deliveries were carried out from a nearby warehouse (less than 1 km far from the Site), therefore optimising shipping and load capacity while minimising environmental impact.

## Ecological value compensation

The urbanisation of the Exhibition Site caused the loss of about 160 equivalent hectares in terms of ecological value. Such loss was offset by a balanced ecological reconstruction programme in the North-West of Milan, featuring the necessary mixture of environmental requalification interventions and ecological improvement in local areas surrounding the Site. The Expo Environmental Observatory, set up by Regione Lombardia, identified the interventions to be carried out as part of the Environmental Impact Assessment procedure on the basis of 43 proposals submitted by local bodies and actors. Applicants were involved both in the planning and management of the new ecosystems over a period of 20-30 years so as to ensure consolidation throughout the territory.

Expo 2015, with the support of ERSAF (Ente Regionale per i Servizi all'Agricoltura e alle Foreste - Regional Body for Agriculture and Forestry Services), is currently carrying out the interventions and providing for their maintenance during the first 5 years (launch phase of the ecosystems), for a total commitment of about 6 million euros. The interventions already implemented - with works already concluded, in progress or in the launch phase - involve 18 projects. The total surface covered amounts to ca. 95 hectares for an estimated ecological recovery of 136 equivalent hectares, corresponding to 85% of the ecological value to be offset. The actual ecological value recovered will be verified upon completion of the works. The need for further projects to reach the compensation objective in terms of quantity is currently being assessed.



## BIBLIOGRAPHY

- DEFRA, *Environmental Impacts of Food Production and Consumption*, 2006.
- European Commission, DG Environment, *Assessment of resource efficiency in the food cycle*, Final report, December 2012.
- European Commission, *Green Public Procurement (GPP), Food and Catering Services Background Product Report*, 2008.
- European Commission, *Green Public Procurement (GPP), Furniture*, 2008.
- European Commission - Directorate General - Joint Research Centre, *Environmental Impacts of Products (EIPRO), Analysis of the life cycle environmental impacts related to the final consumption of the EU-25*, 2006.
- Expo 2015 Spa, *Official participants guide - Self-built exhibition spaces - Design, Construction, Set-up and Dismantling*, 2013.
- Expo 2015 Spa, *Guidelines - Sustainable Solutions - Design, Construction, Dismantling and Reuse*, 2013.
- Expo 2015 Spa, *Official participants guide Self-Built Technical Requirements*, 2013.
- Expo 2015 Spa, *Green Procurement Guidelines*, 2014.
- Expo 2015 Spa, *Sustainability Report*, 2013, 2014.
- Expo 2015 Spa, *The sustainability mosaic*, 2015.
- FAO, *Natural Capital Impacts in Agriculture - Supporting Better Business Decision-making*, 2015.
- Iraldo Fabio, Bruschi Irene, *Economia circolare: principi guida e casi studio*, 2015, DOI: 10.13140/RG.2.1.2493.9604, available online at: [http://www.iefefebocconi.it/wps/wcm/connect/94581886-34f1-4732-b213-398670378f10/GEO\\_Economia+Circolare\\_I+ed\\_2015.pdf?MOD=AJPERES](http://www.iefefebocconi.it/wps/wcm/connect/94581886-34f1-4732-b213-398670378f10/GEO_Economia+Circolare_I+ed_2015.pdf?MOD=AJPERES)
- Politecnico di Milano - Department of Energy, *Guidelines for the reduction of the environmental impact of temporary building and structures in mega events, 2015*, available online at: <http://www.minambiente.it/pagina/sustainability-big-events-expo-2015-case-study>.
- Politecnico di Milano - Department of Energy, *Modello gestionale per il riutilizzo dei materiali edili - Modelli di gestione per il fine vita delle strutture temporanee: il caso EXPO*, 2015, available online at: <http://www.minambiente.it/pagina/sustainability-big-events-expo-2015-case-study>.
- Politecnico di Milano - Department of Energy, *Methodological guidelines for the LCA of temporary buildings in mega events*, 2015, available online at: <http://www.minambiente.it/pagina/sustainability-big-events-expo-2015-case-study>.
- Politecnico di Milano - Department of Energy, *Carbon Footprint del cibo*, 2015, available online at: <http://www.minambiente.it/pagina/sustainability-big-events-expo-2015-case-study>.
- Politecnico di Milano - Department of Energy, *Approfondimento metodologico: viaggi*, 2016, available online at: <http://www.minambiente.it/pagina/sustainability-big-events-expo-2015-case-study>.

## NORMATIVE REFERENCES

- Code for public contracts relating to jobs, services and supplies enforcing directives 2004/17/EC and 2004/18/EC, in GU N. 100 of 2 May 2006.
- Council Regulation (EC) N. 510/2006, 20 March 2006, on the protection of geographical indications and designations of origin for agricultural products and foodstuffs, in GU L 93/12 of 31 March 2006.
- Decree of the Ministry for the Environment of 18/03/2013, *Identification of the technical characteristics for carrier bags*, in GU N. 73 of 27 March 2013.
- European Commission Communication, *Closing the Loop - An EU Action Plan for the Circular Economy*, COM(2015) 614 final.
- European Commission Communication, *EUROPE 2020, A strategy for smart, sustainable and inclusive growth*, COM(2010) 2020, final.
- European Commission, Communication *Integrated Product Policy - Building on Environmental Life-Cycle Thinking*, COM(2003) 302, final.
- European Commission, Communication *Green Paper, Public procurement in the European Union: Exploring the way forward*, COM(96) 583, final.
- EU Directive 2008/98/EU of the European Parliament and of the Council, 18 November 2008, in GU L 312/2 of 22 November 2008.
- EU Directive 2004/12/EC of the European Parliament and of the Council, amending Directive 94/62/EC on packaging and packaging waste, 11 February 2004, in L 47/27 of 18 February 2004.
- European Parliament Resolution of 24 May 2012 on a resource-efficient Europe (2011/2068(INI)).

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