



# Sustainable Procurement Guidelines for UN Cafeterias, Food and Kitchen Equipment

## Background Report

Developed by The Russell Partnership for the United Nations Environment Programme – Division of Technology, Industry and Economics (UNEP-DTIE), 2008

Author: Professor David Russell

Owner/ Editor: UNEP-DTIE, 15 rue de Milan, F-75441 Paris

Disclaimer: UNEP-DTIE accepts no responsibility or liability whatsoever with regard to the information presented in this document



These Sustainable Procurement guidelines are part of a series.  
Other products and services can be found on [www.greeningtheblue.org](http://www.greeningtheblue.org) and [www.ungm.org](http://www.ungm.org)

## UN CAFETERIAS, FOOD AND KITCHEN EQUIPMENT

### *Messages from the United Nations and UNEP*

"I would like to make a public commitment. We are already moving towards making our Headquarters in New York climate-neutral and environmentally sustainable. I would like to see our renovated headquarters complex eventually become a globally acclaimed model of efficient use of energy and resources. Beyond New York, the initiative should include the other UN headquarters and offices around the globe.

We need to work on our operations too, by using energy more efficiently and eliminating wasteful practices. That is why, today, I am asking the heads of all UN agencies, funds and programmes to join me in this effort. And I am asking all staff members throughout the UN family to make common cause with me."



**Ban Ki-moon**  
UN Secretary General  
New York, 5 June 2007  
World Environment Day



**Achim Steiner**  
Executive Director, UNEP  
Geneva, 8 October 2007  
117<sup>th</sup> Assembly of the Inter-Parliamentary Union

"Ban Ki-moon is determined to put global warming at the top of the global political agenda and determined to build the trust so urgently needed if we are to succeed in combating climate change. Under his leadership, the UN is also determined to demonstrate its 'sustainability credentials' by action on the ground and by good housekeeping at home.

Reviews are underway across all agencies and programmes to establish a strategy for a carbon neutral UN and to make the refurbishment of the UN headquarters in New York a model of eco-efficiency.

UNEP is committed to take part in the fight for climate change and in showing leadership. We are committed to become carbon neutral by reducing our energy consumption and carbon footprint and by offsetting emissions."

## *Acknowledgements*

The authors of the Sustainable Procurement Guidelines for UN Cafeterias wish to sincerely thank the following individuals and institutions for their valuable support and comments (in alphabetical order of first name):

Ali Todaro – United Nations, Addis Ababa (UNECA)

Andra Brige – UNDP, Copenhagen

Andrea Henrichsen – United Nations, Santiago de Chile (ECLAC)

Beatriz Atria – United Nations, Santiago de Chile (ECLAC)

Cécile Bordier – UNEP SUN, Paris

David Dugelay – United Nations, Geneva (UNOG)

Irene Menjivar – United Nations, Bangkok (ESCAP)

Isabella Marras – UNEP SUN, Paris

Jaqueline Schroder – United Nations, New York

Lionel Di Rico – UNESCO, Paris

Lova Andre – UNEP SUN, Nairobi

Michael Cora – UNESCO, Paris

Mirjam Steglich – UNEP SUN, Nairobi

Monica Kaushal – United Nations, New York

Pascale Pretty – Russell Partnership

Paul Makin – UNIDO, Vienna

Phil Marston – THISD (Tourism & Hospitality Institute for Sustainable Development)

Roger Gakira – United Nations, Addis Ababa (UNECA)

Romain Kieffer – United Nations, Vienna (UNOV)

Rudy van Dijck – United Nations, Nairobi (UNON)

Simon Beamish – United Nations, Nairobi (UNON)

Stephen Stannah – United Nations, Nairobi (UNON)

## *Purpose of this guide*

### *What is Sustainable Procurement?*

“Sustainable Procurement practices integrate requirements, specifications and criteria that are compatible and in favour of the protection of the environment, of social progress and in support of economic development, namely by seeking resource efficiency, improving the quality of products and services and ultimately optimizing costs.”<sup>1</sup>

Sustainable Procurement practices should be introduced progressively and in full respect of the right of access to the UN market for suppliers from developing countries and countries with economies in transition.

### *How to use the Sustainable Procurement Guidelines?*

The main goal of the Guidelines is to facilitate the implementation of sustainable procurement by providing criteria that may be used by UN staff for the requisition and procurement of goods, civil works and services.

In practice, this means thinking carefully about what the true needs are, as a first step. Then, basing purchasing decisions (for products, services and works) on the lowest environmental impact and most positive social impact which make the most economic sense over the lifetime of the product. Therefore, the guidance covers the following: key environmental impacts, key social considerations, most appropriate means of verification and information on the availability of sustainable products and lifetime costs (where available).

As with local product availability, prices, costs and relevant legislation may vary considerably between regions. The way sustainable procurement is practiced should be adapted to local conditions and markets, and depends on how ambitious the purchasing organization is in terms of sustainable development.

For these reasons, the UN Sustainable Procurement Guidelines comprise of the following for each product and service:

- a detailed **background report**, and
- a practical **product sheet**.

The main role of the **background report** is to provide staff involved in procurement with more comprehensive information on the rationale behind the sustainable procurement guidelines presented in the product sheets. The background reports cover various issues related to purchasing a product and service in an environmentally-friendly and socially-responsible way, such as: identifying the key environmental impacts and social considerations, listing the most appropriate schemes for verification, most relevant legislation regarding the environment and social considerations, and providing an indication of the availability on the market of sustainable products.

The **product sheets**, on the other hand, provide sustainability criteria designed specifically for the various phases or steps of the UN procurement cycle. These are: detailing the subject matter of tenders, technical specifications (or terms of reference, for services), sourcing suppliers evaluation criteria and contractual clauses. Guidance is also provided on how compliance with the criteria should be verified. The criteria are also presented in check-list form for use by requisitioners and a weighting matrix is provided.

---

<sup>1</sup> Definition adopted by the High Level Committee on Management Procurement Network.

## UN CAFETERIAS, FOOD AND KITCHEN EQUIPMENT

### *Regional differences*

As market conditions vary from region to region, the possibilities for sustainable procurement may also vary. Therefore, for certain product groups different product sheets may be produced for different regions. The region each product sheet is produced for will be clearly marked on the document itself and also on the SUN Greening the Blue website and the UNGM SP knowledge centre where they can be downloaded.

### *Differences in ambition*

Additionally UN procurers must decide whether they wish to apply the “basic” or “advanced” criteria:

- **Basic sustainability criteria** address the most significant environmental and social impacts and require minimum effort in verification and minimal increases (if any) in price
- **Advanced sustainability criteria** are intended for use by procurers who seek to purchase the most advanced environmentally-friendly and socially-responsible products available on the market, and may require additional administrative effort or result in a price increase as compared to other products fulfilling the same function.

# UN CAFETERIAS, FOOD AND KITCHEN EQUIPMENT

## *Table of content*

Messages from the United Nations and UNEP .....	1
Acknowledgements.....	2
Purpose of this guide.....	3
Table of content.....	5
Abbreviations, Acronyms and Glossary .....	6
<b>1. Introduction.....</b>	<b>8</b>
1.1 Scope.....	8
1.2 Sustainability and Food.....	8
1.3 Catering and the UN.....	9
<b>2. Key Environmental Impacts of Food .....</b>	<b>10</b>
2.1 Use of Finite Natural Resources.....	10
2.2 Disruption or destruction of ecosystems and threat to biodiversity .....	15
2.3 Waste.....	22
<b>3. Key Social issues associated with Food Production .....</b>	<b>25</b>
3.1 Workers rights, Pay and Conditions.....	25
3.2 Fair Pricing.....	27
3.3 Religious Requirements .....	28
3.4 Health & Nutrition of Consumers:.....	28
3.5 Animal Welfare.....	30
3.6 Diversity .....	31
<b>4. Implementing the Sustainable Procurement Guidelines in UN Cafeterias.....</b>	<b>32</b>
4.1 Solutions for more sustainable UN cafeterias .....	32
4.2 Sustainable Facilities and Equipment.....	33
4.3 Cleaning, Furniture and Office Materials.....	38
4.4 Packaging and Disposables.....	38
4.5 Waste.....	39
4.6 A Key Driving Force: People .....	40

*Abbreviations, Acronyms and Glossary***Agrochemicals**

A generic term for the various chemical products used in agriculture. In most cases, *agrochemical* refers to the broad range of pesticides, including insecticides, herbicides, and fungicides. It may also include synthetic fertilizers, hormones and other chemical growth agents.

**CFC**

Chlorofluorocarbon.

**Codex Alimentarius**

The Codex Alimentarius Commission was created in 1963 by FAO and WHO to develop food standards, guidelines and related texts such as codes of practice under the Joint FAO / WHO Food Standards Programme. The main purposes of this Programme are protecting health of the consumers and ensuring fair trade practices in the food trade, and promoting coordination of all food standards work undertaken by international governmental and non-governmental organizations.

**FAO**

Food and Agriculture Organization.

**FWD**

Food Waste Disposal.

**GHGs**

Greenhouse gases.

**GM**

Genetically Modified.

**IETC**

International Environmental Technology Centre.

**IFOAM**

International Federation of Organic Agriculture Movements is the worldwide umbrella organization for the organic movement, uniting more than 750 member organizations in 116 countries.

**ILO**

The International Labour Organization is the international organization responsible for drawing up and overseeing international labour standards. It is the only 'tripartite' United Nations agency that brings together representatives of governments, employers and workers to jointly shape policies and programmes promoting Decent Work for all.

**IMO**

The International Maritime Organization is the United Nations specialized agency with responsibility for the safety and security of shipping and the prevention of marine pollution by ships.

**Living Wage**

The minimum hourly wage necessary for an individual to meet basic needs, including shelter (housing) and other incidentals such as clothing and nutrition, for an extended period of time or a lifetime.

## UN CAFETERIAS, FOOD AND KITCHEN EQUIPMENT

### Montreal Protocol

Montreal Protocol is an international treaty designed to protect the ozone layer by phasing out the production of numerous substances believed to be responsible for ozone depletion.

### Rain Forest Alliance

The Rainforest Alliance works to conserve biodiversity and ensure sustainable livelihoods by transforming land-use practices, business practices and consumer behavior

### UNGM

United Nations Global Marketplace. It is the global portal to the UN procurement system. UNGM brings together UN procurement staff and the supplier community and simplifies the registration process for vendors willing to supply the UN.

### UNEP DTIE

United Nations Environment Programme - Division of Technology, Industry and Economics. UNEP DTIE encourages decision makers in government, local authorities and industry to develop and implement policies, strategies and practices that are cleaner and safer, make efficient use of natural resources, ensure environmentally sound management of chemicals, reduce pollution and risks for humans and the environment, enable implementation of conventions and international agreements, and incorporate environmental costs.

### UNEP SUN

UNEP Sustainable United Nations facility. It was established in 2008 with the aim of supporting UN organizations, as well as organizations outside the UN system to move towards climate neutrality.

### UNICEF

United Nations Children's Fund (formally United Nations International Children's Emergency Fund) is the world's leading organization protecting the rights of children and young people. Around the world, children's rights are being denied on a daily basis, including in emergencies such as natural disasters and conflict.

### WHO

World Health Organization. WHO is the directing and coordinating authority for health within the United Nations system. It is responsible for providing leadership on global health matters, shaping the health research agenda, setting norms and standards, articulating evidence-based policy options, providing technical support to countries and monitoring and assessing health trends.



# UN CAFETERIAS, FOOD AND KITCHEN EQUIPMENT

## 1. Introduction

This document has been produced to provide the background to the accompanying 'Sustainable Procurement Guidelines Product Sheets for Food within UN Cafeterias'. It complements the 'UN Procurement Practitioners Handbook' and the 'UN Sustainable Procurement Guide'.

The consultation of procurement practitioners as well as catering managers and those responsible for food sourcing from a variety of UN stations worldwide has assisted in developing a set of guidelines which should be practical and workable for the majority of users. However, sustainability, especially in the context of food, is changing and improving all the time, and expectations, as well as realistically achievable targets will continue to move closer to the ultimate goal of 100% sustainability. The targets set out in these documents should be considered as a starting point, subject to ongoing scrutiny and revision.

### 1.1 Scope

In practice, the procurement of catering services for Cafeterias precludes the need for the UN to procure food directly in most cases, as catering service providers are usually contracted to procure and supply food on behalf of the UN, as well as provide the cooking, service, and management services associated with the day to day running of the facilities available. This can extend to the provision of equipment (both light and heavy<sup>2</sup>), finishes and fittings in the catering areas which may be funded by either the catering company, or the UN. In some UN duty stations, catering is handled in house, and in these instances, the UN organization will be procuring food directly.

### 1.2 Sustainability and Food

"On this World Environment Day, let us recognise the need to slow the momentum of the dramatic environmental change we are seeing at the poles and around the globe. And let each of us pledge to do our part to fight climate change<sup>3</sup>."

The definition of sustainability used most widely is that of the Brundtland Commission 'sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs'.

Sustainability encompasses three distinct areas, financial, social and environmental durability. All these areas are to be considered when considering sustainable food and catering services.

In the context of the UN, there are a number of other more specific aims that sourcing food and catering services in a sustainable way can help to address from within the Millennium Development Goals, namely:

- End poverty and hunger
- Gender equality
- Health (maternal and child)
- Environmental sustainability
- Global partnership

<sup>2</sup> Heavy equipment refers to kitchen equipment such as ovens, serving counters, coffee machines etc. Light equipment refers to any more portable equipment such as electric whisks, knives, plates and ladles. Furniture used in the dining areas falls under light equipment.

<sup>3</sup> Message from UN Secretary-General, World Environment Day, June 5, 2007.

## UN CAFETERIAS, FOOD AND KITCHEN EQUIPMENT

The growing population of the planet (fourfold increase in past 100 years and further increases from 6.7 billion in 2006 to 9.2 billion in 2050 predicted<sup>4</sup>), is placing strain on the ability of the world's agricultural production to meet the nutritional needs of the entire global population. Ensuring that agricultural methods and food supply systems are sustainable is more important than ever.

Increasingly large global foodservice brands are recognising the long term need for sustainability within their business modelling, as well as the marketing potential of sustainable initiatives within their corporate strategy. Kraft Foods have been a partner of the Rainforest Alliance since 2003 and have become the largest buyer of certified coffee beans in the world. Unilever is moving to 100% 'certified sustainable' tea within the Lipton and PG brands, and Cadbury have recently launched a movement towards Fairtrade, starting with their prime branded bar 'Cadbury's Dairy Milk', in addition to the work that they already undertake through the Cadbury Cocoa Partnership.

### 1.3 Catering and the UN

Food, as such a basic human need, touches on all areas and agencies of the UN. For most, the existence of restaurants, Cafeterias and coffee shops is a day-to-day fact of life, and an ancillary service.

Food is central to the activities of the World Health Organization, the International Fund for Agricultural Development, the Food and Agriculture Organization of the United Nations, and the World Food Programme.

In addition, due to the nature of agriculture as a cornerstone to many economies, both developed and developing, food and the influence of any UN procurement decisions relating to food, on corporations and individuals worldwide, has a direct bearing on all of the economically focused agencies of the UN, e.g. the UN Conference on Trade and Development and in addition the World Trade Organization, and due to the direct bearing on their activities, also the likes of the International Maritime Organization, the International Labour Organization, the Forum on Forests committees etc.

This Background Report and Product Sheets are intended to address, in the first instance, the needs and policy that will impact on the internal food service operations within the permanent UN duty stations around the globe.

Stations in Paris, Geneva, Vienna, Copenhagen, Addis Ababa, Nairobi, Bangkok, Santiago de Chile, New York have been contacted, in order to ascertain the likely scope of catering operations across the wider organizations. Across the contacted agencies of the UN, catering provision varies enormously in scale and style of provision, from small restaurant/Cafeteria services, through to conference centres handling thousands of delegates at a time.

---

<sup>4</sup> UN Population Division 2007

## 2. Key Environmental Impacts of Food

Environmental sustainability is only one of the three pillars that form a wholly sustainable activity, alongside financial and social sustainability. It is however, an area where significant developments have been made over recent years, as the effects of a lack of environmental consideration have started to be seen. Acid rain, ozone holes, and severe weather events linked with climate change have all appeared in headlines and discussion topics across the world in the past ten years. The need to consider and manage the impacts of our activities on the planet has become a rapidly rising item on the agenda of governments, public and private enterprises, as well as in homes around the world, in part because it has started to impact on the other two pillars; the financial and social sustainability of enterprises and lifestyles.

Food is extremely closely related to the environment, not least because it is the environment, very directly, which provides us with food, one of humankind's most essential needs. The ability of the planet to continue feeding its population is being placed in jeopardy by the way in which it is being managed presently. In addition, the production of food causes some of the most significant impacts on the environment of any of our activities.

The ability to build relationships with growers and processors is usually much improved when they are located geographically closer to the buyer. This enables buyers to understand, with clarity and certainty, the way in which a product is produced, from resource use, farming methods, through to waste handling. Knowledge of these factors allows buyers to make more effective decisions about the environmental practices which they are supporting.

Three broad environmental concerns relate to food production 2.1) the use of finite resources, 2.2) the disruption of ecosystems, taking into account climate change and modern agriculture and 2.3) the release of waste. All of these areas are considered in turn below.

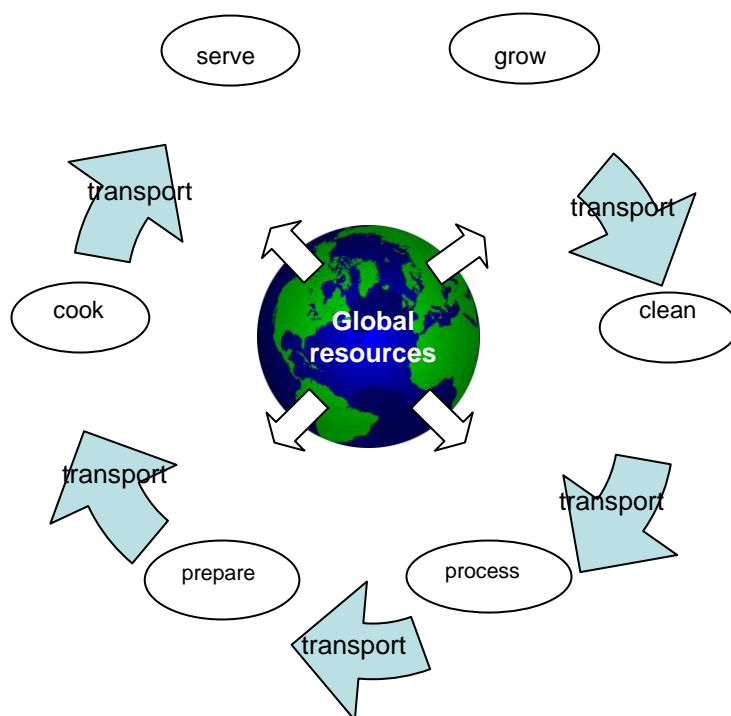
### 2.1 Use of Finite Natural Resources

Agriculture is a resource intensive industry, occupying more than 50% of the world's habitable land mass, and as much as 8% of the global water use<sup>5</sup>. Each item of food that we consume, as well as the ancillary items required in the growing, cleaning, processing, preparation, cooking and serving of it, requires the use of finite natural resources.

---

<sup>5</sup> For the production of livestock (inclusive of feed) alone: Livestock's Long Shadow – Environmental Issues and Options, FAO 2006

# UN CAFETERIAS, FOOD AND KITCHEN EQUIPMENT



**Source: Global Resource Utilisation – Russell Partnership 2010**

At present, globally, we use 30% more resources than the planet can replenish,<sup>6</sup> which means that eventually, if we continue to consume at this rate, we will run out. Choosing certain types of food, methods of production, pieces of equipment and packaging and disposable items is key to improving the environmental sustainability of the food and catering services throughout the UN.

According to the WWF report 'One planet living'<sup>7</sup>, to survive we need to reduce consumption levels globally to a point where use of natural resources – water, fossil fuels, minerals, flora and fauna – can be sustained by our ecosystems. UNEP and many others fully share this view.

## Water

Water is one of the planet's most crucial resources. It is the presence of water on earth that allowed the creation and evolution of life on this planet. We need water to drink, but also to enable the other functions of life, from cooking and eating to industry and manufacture. Whilst remaining within the earth's atmosphere, and therefore impossible to 'use up', water is only useful if it is clean, a process which naturally, can take many years, as it is filtered through ecosystems, or requires significant energy (therefore resource) usage to filter mechanically.

Livestock sector accounts for over 8% of global human water use.<sup>8</sup>

<sup>6</sup> [http://www.panda.org/what\\_we\\_do/how\\_we\\_work/conservation/one\\_planet\\_living/](http://www.panda.org/what_we_do/how_we_work/conservation/one_planet_living/)

<sup>7</sup> [http://www.panda.org/what\\_we\\_do/how\\_we\\_work/conservation/one\\_planet\\_living/](http://www.panda.org/what_we_do/how_we_work/conservation/one_planet_living/)

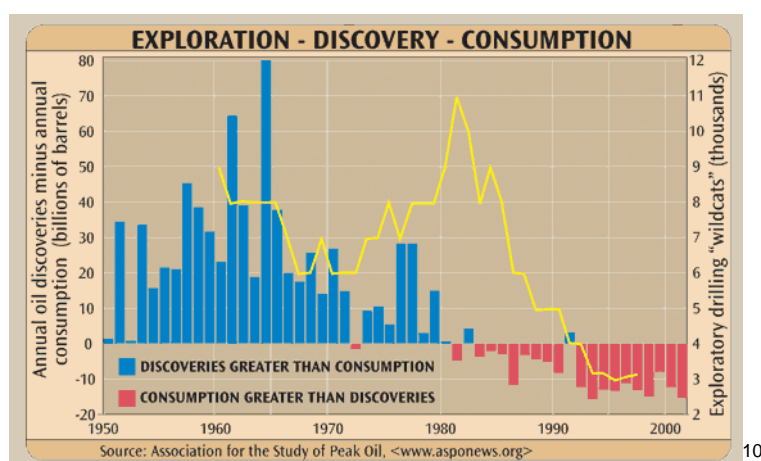
<sup>8</sup> Livestock's Long Shadow – Environmental Issues and Options, FAO 2006

# UN CAFETERIAS, FOOD AND KITCHEN EQUIPMENT

## Fossil Fuels

There is some ongoing debate over the extent to which fossil fuels, coal, oil and gas, are still formed under current climatic conditions<sup>9</sup>. There is however consensus on the fact that these fuel types take many hundreds of millions of years to transform from their original states as plant and animal matter into useable fuels. The rate at which we are consuming fossil fuels is vastly in excess of any potential formation which is happening. Furthermore, the burning of fossil fuels, such as coal and oil, have caused the concentrations of greenhouse gases to increase significantly in our atmosphere, which has caused climate change (which will be discussed hereafter).

Estimates of the global reserves of these valuable commodities are variable and difficult to certify. However the graph below demonstrates that it is extremely likely that reserves are declining, with consumption outweighing discoveries.



Source: association for the Study of Peak Oil, [www.asponews.org](http://www.asponews.org)

Meat and dairy products are the most energy intensive foods. 6kg of plant protein is required to produce 1kg of meat protein<sup>11</sup>. Dietary preferences have been changing, with the influence of western food styles resulting in higher meat consumption levels, which are predicted to continue rising (from 37.4 kg per year in 2000 to 52kg per year by 2050<sup>12</sup>). 50% of the global production of cereals is used to produce animal feed currently, with intensive meat production requiring more cereal based feed than natural livestock grazing.

Agrochemicals require energy in their production and distribution. The table below demonstrates the reduced energy use per tonne of **organic v non organic** produce for a number of products, demonstrating that in nearly all cases, the organic option is much less demanding on resources.

<sup>9</sup> Most agree that fossil fuel is still produced today, but at a vastly reduced scale to that which occurred during the periods when the fuels that we are extracting today were formed.

<sup>10</sup> <http://www.theglobaleducationproject.org/earth/energy-supply.php>

<sup>11</sup> [http://www.wwf.org.uk/what\\_we\\_do/changing\\_the\\_way\\_we\\_live/food/](http://www.wwf.org.uk/what_we_do/changing_the_way_we_live/food/)

<sup>12</sup> FAO 2006

# UN CAFETERIAS, FOOD AND KITCHEN EQUIPMENT

% Variance in Energy Use Per Tonne of Organic Produce against Conventional Produce			
Vegetables	%	Livestock	%
Leeks	58 less	Beef	35 less
Wheat	29 less	Lamb	20 less
Carrots	25 less	Pork	13 less
Oilseed rape	25 less	Eggs	14 more
Onions	16 less	Chicken	32 more
Potatoes	2 more	Milk	38 less

Source: [www.wwf.org.uk](http://www.wwf.org.uk)

## Minerals and Metals

Ongoing technological developments result in more and more significant chemical changes being made, through refinement or purification, to the naturally occurring mineral and metal elements found on earth. This releases their potential for human benefit, but often means that at the end of their useful life they can be harmful due to their new chemical make up, their concentration, or simply due to the fact that recipient ecosystems are not adapted to their presence. Some of the resulting impacts are discussed below under Waste.

Once extracted, and potentially altered in state, minerals and metals are often very expensive or impossible to return to their original state. We must respect the finite stores that we have of these minerals and metals.

Fertiliser is added to soil (and crops) to increase the levels of mineral elements required for the growth of the crop, where soil health is poor and unable to naturally restore the levels of these elements. Many minerals are extracted for use in fertiliser, with lime and potassium being amongst the most proliferate.

Steel and aluminium are widely used for packaging and kitchen equipment, as well as agricultural machinery. Whilst widely recycled, these metals are also finite resources which need to be used with caution.

## Flora and Fauna

The rich diversity of flora and fauna found worldwide, and the threats that are posed to it, are discussed below under 'Disruption to ecosystems and threat to biodiversity', due to the wide ranging impacts that various food related activities have on this especially precious resource.

Wood is a particular area of concern within the catering industry due to its extensive use for napkins, disposable tableware, furniture and packaging. Wood is a resource which is very slow to replenish, but which is fast growing enough to be relatively easily managed sustainably, with good forest management, allowing an equal amount of re-growth for the timber removed annually.

## Local and Seasonal Foods

Foods grown locally potentially reduce energy use for transport, growing and storage. There are a number of advantages to buying foods that are grown and/or processed closer to the point of consumption.



## UN CAFETERIAS, FOOD AND KITCHEN EQUIPMENT

Foods grown locally reduce usage of energy for transport, although this saving can be counterbalanced by the increased energy used in producing or storing certain products outside of their natural crop zones or seasons. For example fruits grown in heated greenhouses may require more energy to grow in the northern hemisphere than to produce further south and transport to the point of consumption, especially if transported by sea or road. Locally grown products may require chilled storage in order to preserve them for consumption out of season. Again the energy used for the storage may be greater than that required to transport a product grown further afield.

For this reason, buying locally must be considered hand in hand with buying seasonally. Selecting products that are within their natural growing season in the local area will enable purchase from local producers without the risk that energy has been expended on artificial light, heat or agrochemicals to induce early or late season production. For products that are in demand year round, the transport impacts of products grown in season in another part of the world are often lower than the energy requirements of growing them locally. In this instance a lower resource use impact choice would be a non local product.

In either case, the products to avoid are almost always those requiring heat, light, or high levels of agrochemicals in order to produce out of season in any part of the world, or those requiring temperature controlled storage.

1kg of asparagus flown from California to the UK uses 900 times more energy than growing the asparagus in the UK<sup>13</sup>.

The same logic applies to bottled water, which should come from the most local source possible (no transporting French mineral water to South America!).

Each stage of food processing requires energy use, and it could easily be argued that if an item requires cooking to be eaten, undertaking this process in a factory, or commercial kitchen environment could be more energy efficient due to the economies and efficiencies of scale.

One counter argument, however is that most processed food products are made up of a large number of constituent parts, all of which have to travel to the point of processing (e.g. the factory), and then onto the consumer in the form of a finished product.

For example, a farm in Kenya grows onions and courgettes, which are used in a vegetable kebab. The peppers for the kebab are grown in Amsterdam, and are flown to Kenya for washing, chopping and processing into the kebab product, which is packaged and flown to the UK for sale. The peppers are making a long return journey, whilst a consumer in the UK could have bought whole onions and courgettes (even if transported from Kenya), and the whole peppers (likely to have been shipped from the Netherlands), made the kebabs at home and saved a few thousand air miles, not to mention the several layers of packaging required to keep the kebabs fresh, as well as the energy required to keep the kebabs chilled throughout their journey to the supermarket shelf.

Another counter argument is that, because many processed foods are designed to be eaten hot, or 'finished' at the point of consumption, they will actually require heating twice, using twice the energy. To compound this problem, in order to prevent unsafe levels of bacteria growing in processed foods, cooked foods are usually rapidly chilled, and stored at low temperatures until used, both processes requiring energy use. Energy can be a kitchen's highest cost after labour.<sup>14</sup>

<sup>13</sup> Revealed: The Real Cost of Air Travel, McCarthy Woolf and Harrison, The Independent 27 May 2005

<sup>14</sup> Energy efficiency in commercial kitchens, CIBSE TM50: 2009

# UN CAFETERIAS, FOOD AND KITCHEN EQUIPMENT

Processed foods are the most prolific users of additives, each requiring energy and resources to create, and transport to the point of processing.

A distinction should be drawn between processed and preserved foods. Preserving foods has been key to human survival, enabling us to eat throughout the year, when foods could not be grown all year round. The most simplistic and traditional methods of drying and salting food have now been developed and refined to include the tins, bottles and packets that are commonplace in kitchens worldwide. Preserving foods for storage at ambient temperatures assists in the consumption of local and seasonal foods, and allows for less resource intensive transport methods to be used for foods that travel.

Preserving does also require the use of resources, however, in most cases, the detrimental effects of the resource use and waste generation can be outweighed by the reduction in waste and resource use that the preservation of the food for use in the longer term gives.

## 2.2 Disruption or destruction of ecosystems and threat to biodiversity

The variety of species, genes and ecosystems in existence worldwide are threatened in various ways by modern lifestyles and agricultural practices. 4,000 species of plants and animals and over 87% of bird species are threatened by agriculture<sup>15</sup>, 33% of livestock varieties have disappeared or are close to it, 30,000 vegetable varieties have become extinct in the last century; one is lost every 6 hours.<sup>16</sup>

The importance of retaining diverse ecosystems, with a rich variety of flora and fauna types, is complex, but pertains to the need to remain adaptable and flexible to changes in the world climate, and resource needs of future generations. Ecosystems provide us with the basics of water, heat, shelter and food, as well as the more diverse requirement of human existence as we know it today, such as medicine, leisure, and culture.

Ecosystems are fragile, due to the levels of interdependencies between the various elements. Very minor changes can have both predictable and unpredictable outcomes and effects on an ecosystem, potentially causing all or part of it to fail.

Wild fish harvesting and modern agricultural practices are responsible for significant changes to their respective ecosystems. The effects of climate events are also becoming more and more apparent worldwide. Each of these areas is considered in turn below.

### *Wild Fish Harvesting*

In marine environments, fishing can disrupt or completely destroy a localised ecosystem by reducing stocks of certain fish, and therefore upsetting the entire food chain which that fish forms a part of<sup>17</sup>. Up to 80% of the world's primary fisheries stocks are thought to have been exploited to close to or beyond their optimum harvest capacity and therefore require effective and precautionary management<sup>18</sup>.

Bottom trawling<sup>19</sup> equipment kills and damages seabed plants and corals, which are slow growing and require long periods of time to build into complex living organisms/ecosystems.

<sup>15</sup> The Environmental Food Crisis, UNEP / International Union for the Conservation of Nature Red List ([www.iucnredlist.org](http://www.iucnredlist.org))

<sup>16</sup> [www.slowfoodfoundation.org](http://www.slowfoodfoundation.org)

<sup>17</sup> The Environmental Food Crisis, UNEP

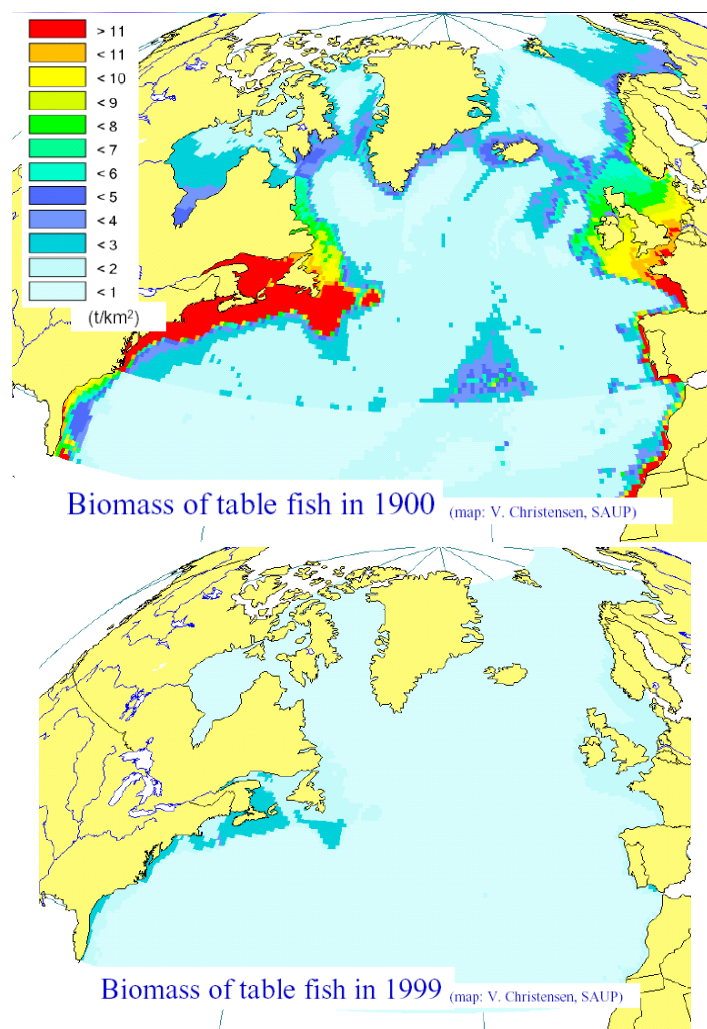
<sup>18</sup> FAO Fisheries Department, 'The State of World Marine Fishery Resources' (Rome Italy, 2005 and 2007), <http://www.fao.org/fishery/sofia/en>

<sup>19</sup> Bottom Trawling is trawling along the sea floor. The scientific community divides bottom trawling into benthic trawling and demersal trawling. Benthic trawling is towing a net at the very bottom of the ocean and demersal trawling is towing a net just above the benthic zone



## UN CAFETERIAS, FOOD AND KITCHEN EQUIPMENT

Most fishing of wild fish takes place in a very small area of the world's oceans, (as much as 50% of marine landings in 2004 were caught in an area covering less than 7.5% of the world's oceans<sup>20</sup>) mainly due to accessibility (distance from land and depth - although the depth of catches is increasing as fish stocks are less available at lower depths in recent years), but also due to the environments in those places being suited to the sustaining of the diverse marine ecosystems required to allow fish to thrive.



The dramatic decline in biomass of fish (tonnes per km<sup>2</sup>) in the North Atlantic is graphically illustrated by these two snapshots from 1900 and 1999. Fish stocks shown in red on the left (largely round the Grand Banks area) were over-fished, leading to permanent loss of previously abundant fish populations for human food (and the loss of 40,000 fishing livelihoods).<sup>21</sup>

The impact on ecosystems and reduction in biodiversity is particularly felt in the marine environment, an area where we still gather from the natural stock of fish, rather than relying primarily on farmed seafood (as we do for meat, cereal, fruit and vegetables).

<sup>20</sup> The Environmental Food Crisis, UNEP

<sup>21</sup> Quirin Schiermeier, Nature 419, 662-665 (17 October 2002) Fisheries science: How many more fish in the sea?

## UN CAFETERIAS, FOOD AND KITCHEN EQUIPMENT

Aquaculture production is playing an increasing role in providing for human consumption of seafood. In the past few years, major increases in the quantity of fish consumed have originated from aquaculture. The average contribution of aquaculture to *per capita* seafood available for human consumption rose from 14 per cent in 1986, to 30 per cent in 1996 and to 47 per cent in 2006, and (according to UN figures) can be expected to reach 50 per cent in the next few years. China is mainly responsible for this increase – both in consumption and production.<sup>22</sup>

Whilst farming fish may appear to circumvent the disturbances caused to marine ecosystems and wild fish stocks, unfortunately this is often not the case.

Salmon, trout and shrimp account for 50% of fishmeal requirements of the aquaculture industry, but only 10% of the production volumes<sup>23</sup>. These popular breeds/varieties of fish, are heavily dependent on fishmeal.

Whilst other varieties, such as carp or tilapia feed mainly on vegetable based feed, they too are simply displacing the issues, due to the usually non sustainable nature of their feed production (predominantly soya based).<sup>24</sup>

In summary the aims for sustainable fish and seafood are as follows:

- Maintenance of species population
- No bottom trawling, poisons or explosives
- No significant, measurable increases or decreases in aquatic life dependant on the species for food or as a predator
- Compliance with international and local laws
- Use of equipment designed to minimize by-catch
- Live release of by-catch or where dead declare and land
- Limit loss of equipment, oil or catch

### *Climate Change*

This is the most wide reaching change to the planet's ecosystem in recent years. The increase in the presence of various 'greenhouse gases' (GHGs), with an increase in the ratio of carbon dioxide, methane and nitrous oxide, in the earth's atmosphere is thought to cause an increase in the retention of the heat from the sun within the earth's atmosphere, and therefore a heating of the planet, in excess of its natural temperature cycles.

The release of carbon dioxide, methane and other GHGs is thought to have increased significantly with the intensification of industry worldwide, as fossil fuels (coal, oil and gas) are burnt for energy. 29 billion tonnes of CO<sub>2</sub> was emitted in 2008 due to energy (transport, electricity, residential, industry, etc.)<sup>25</sup>.

Commercial agriculture is energy intensive, requiring powered tractors, irrigators, sprayers, and harvesters. Agrochemical production also requires energy and water. Ruminant livestock raised for meat and dairy, release methane as part of their digestive process. In fact, methane emissions from livestock produce 18% of total GHGs emissions.<sup>26</sup>

<sup>22</sup> Statistics in these paragraphs are from: Food And Agriculture Organization of the UN, Fisheries Department, 'The State of World Marine Fishery Resources' (Rome Italy, 2005 and 2007), <http://www.fao.org/fishery/sofia/en>

<sup>23</sup> Deutsch et al (2004). Feeding Aquaculture growth through globalisation: Exploitation of marine ecosystems for fishmeal. Global Environmental Change – Human and Policy Dimensions 17 (2): 230-249

<sup>24</sup> The Environmental Food Crisis, UNEP

<sup>25</sup> [www.cdclimat.com/IMG/pdf/key\\_figures\\_on\\_climate\\_2011\\_cdc\\_climat\\_research\\_meddtl\\_id.pdf](http://www.cdclimat.com/IMG/pdf/key_figures_on_climate_2011_cdc_climat_research_meddtl_id.pdf).

<sup>26</sup> Livestock's Long Shadow – Environmental Issues and Options, FAO 2006

## UN CAFETERIAS, FOOD AND KITCHEN EQUIPMENT

31% of climate change can be directly attributed to food, drink, tobacco and narcotics consumption,<sup>27</sup> and 1.6bn tonnes of CO<sub>2</sub> can be attributed to changes in land use such as deforestation.<sup>28</sup>

Amongst the assumed resulting impacts of climate change are potentially melting of glaciers across the globe, rising sea levels swamping low lying land and disruption of world weather systems, in turn potentially creating higher instances of flooding from heavy rainfall, hurricanes etc. It is believed that an overall increase in global temperatures of 0.74 degrees C has occurred over the last 100 years (1906-2005),<sup>29</sup> and it is believed that further increases could have even more dramatic impacts than are currently being felt.

76% of all disasters events in the last 20 years were weather and climate related, accounting for 45% of the deaths (and 80% of economic losses) from natural hazards.<sup>30</sup>

300,000 people a year die as a result of climate events currently.<sup>31</sup>

A billion people (1/7<sup>th</sup> of the world's population) could be forced to relocate due to the impacts of climate change (sea level rises, water shortages, deteriorating pasture land, conflicts and famine).<sup>32</sup>

The concentration of greenhouse gases in the atmosphere and changes in temperature are, and will continue to cause movement in the crop growing patterns towards the poles. Whilst some crops are simple to seed and grow in new areas, it takes time to establish good working practices and achieve the best possible yields. Further to this, some crops require years to become established, such as fruit trees and vines, and rapid climatic changes may not allow sufficient time for agriculture to 'catch up'.

Sulphur dioxide and nitrogen dioxide are released during the combustion of fossil fuels. These gases then dissolve in the water in the atmosphere, which falls as rain (or other forms of precipitation, often at some distance from the point where the gas has entered the atmosphere). The sulphur and nitrogen form sulphuric and nitric acid, and although weak, these acids cause damage.

<sup>27</sup> Environmental Impact of Products (EIPRO), EUR 22284 EN 2006

<sup>28</sup> The Green Food Bible, Judith Wills 2008

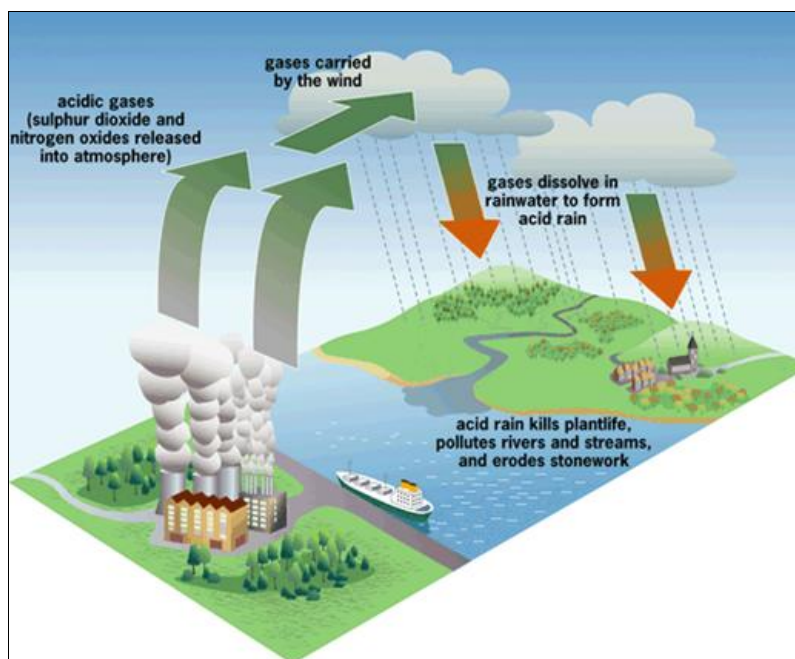
<sup>29</sup> IPCC 4<sup>th</sup> Assessment Report on Climate Change 2007 –Synthesis Report

<sup>30</sup> ISDR Global Assessment Report on Disaster Risk Reduction, 2009

<sup>31</sup> <http://www.christianaid.org.uk/pressoffice/pressreleases/december2009/copenhagen-tragedy-for-millions-in-poor-countries.aspx>

<sup>32</sup> Human Tide: The real migration crisis, Christian Aid Report 2007

# UN CAFETERIAS, FOOD AND KITCHEN EQUIPMENT



33

Source: <http://www.goodforyou.com.sg/wordpress/?m=200808>

In soil the acid causes a leaching of calcium, magnesium and potassium, and at higher levels, of aluminium and hydrogen. Once leached from the soil, it is unable to sustain plant growth, without the re-addition of these elements via fertilisation<sup>34</sup>. Trees fail to take up sufficient water, and the higher levels of aluminium (and other metals) are passed through the food chain where they can cause further harm<sup>35</sup>.

Trees are also damaged externally, as are manmade structures, bridges, buildings, pipe networks etc, due to the erosion caused by the acid.

These acids alter the pH levels in ponds, lakes and watercourses, and cause the water to absorb aluminium. This combines with the high mineral and metal content in soil runoff, entering aquatic systems. The low (acidic) pH and high levels of aluminium are toxic to some plants and fish and eventually impacts also on bird life and throughout the food chain. In extreme cases pH levels can drop so low that all living organisms are killed, leaving 'dead' lakes (examples are found in Scandinavia in particular, where the gases released throughout Europe often fall as precipitation.)

The more acidic water carrying higher levels of aluminium (and other metals) can enter the drinking water cycle, where higher metal content can cause damage to human health. Higher intakes of metals have been linked to Alzheimer's and Parkinson's diseases, muscular dystrophy and multiple sclerosis, as well as organ damage and reduced mental and nervous system function.

Carbon dioxide also impacts on oceanic ecosystems. Approximately one quarter<sup>36</sup> of the carbon dioxide that is emitted into the atmosphere by human activities is absorbed by the oceans, where it becomes carbonic acid. Increasing concentrations of carbonic acid in the ocean can prevent crustaceans and marine organisms from building shells and skeletons, and can also affect their physiology and reproductive systems.

<sup>33</sup> <http://www.goodforyou.com.sg/wordpress/?m=200808>

<sup>34</sup> See below Agrochemicals - Fertilisers

<sup>35</sup> See bioaccumulation/biomagnification below

<sup>36</sup> Ocean Acidification, A Summary for Policymakers from the Second Symposium on the Ocean in a High CO<sub>2</sub> World (<http://www.ocean-acidification.net/OAdocs/SPM-lorezv2.pdf>)

# UN CAFETERIAS, FOOD AND KITCHEN EQUIPMENT

## *Modern Agriculture*

### **Change of land use**

Intensive agriculture destroys natural habitats, replacing them with monocultural crop or animal production. As well as instigating changes in grassland ecosystems, significant areas of rainforest have been, and are continually being, removed for agricultural usage. Up to 70% of previously forested land in the Amazon is used as grazing pasture, and feed crops cover the majority of the remainder. 33% of arable land is taken up with livestock feed growing and 30% of the world's (ice free) surface area is used for livestock production<sup>37</sup>.

The impacts of this are especially significant because this particular ecosystem (Amazon Rainforest) has been identified as one of the richest sources of diverse flora and fauna. Also, the very rich soils which are exposed when trees are cleared are very rapidly exhausted of their nutrients and structure, by the agriculture that takes place on them. In addition, the dense rainforest absorbs and traps CO<sub>2</sub>, acting as a 'carbon sink,' so the removal of these trees adds to the factors of climate change.

The limited varieties of plants and breeds of animal selected for commercial cultivation can also introduce or increase the instance of disease into pre-existing native strains in an area. Ecosystems can also be disturbed as agriculture introduces new predators and food sources.

In some instances, this is inflated to extreme proportions, such as in the case of the 'Cane toad' introduced to Australia from Hawaii (originally native to South America) as a pest control method. Eating the cane beetles that destroy sugar cane, it has reduced numbers of many native Australian reptiles (lizards, snakes and crocodiles), due to the fact that it is poisonous to most animals when ingested.

### **Agrochemicals**

As well as requiring the use of finite resources in their production, agrochemicals can produce unwanted negative side effects to their intended yield and production benefits.

Fertiliser use has grown tenfold since 1950, with a corresponding increase in food production of only three times.<sup>38</sup> As much as 50% of artificial fertilisers can 'leach' into rivers and streams causing eutrophication, a process that starves fish and other water based animals of oxygen due to excessive plant or algae growth. In extreme cases this can result in 'dead zones' devoid of all plant and animal life.

Modern agriculture is reliant on the use of pesticides (including herbicides, fungicides, and bactericides) to ensure that the chosen crop or animal (including fish) is subject to as little competition or attack within its growing environment. This means the preventing of growth of, destroying, repelling or mitigating pests. This kills the food sources and natural habitats of native species, or the creatures themselves, and impacts are reverberated into a much wider zone, as the knock on effects of a disturbance to a chain are felt.

Chemicals which may be harmless, at the levels at which they are ingested by the intended recipient (see below under Social Impacts - Health & Nutrition), may bioaccumulate or be biomagnified<sup>39</sup> through the food chain to cause hazardous impacts to organisms higher up.

<sup>37</sup> Facts in this paragraph from Livestock's Long Shadow – Environmental Issues and Options, FAO 2006

<sup>38</sup> State of the World, Worldwatch Institute 2002

<sup>39</sup> Bioaccumulation occurs when an organism absorbs a toxic substance at a rate greater than that at which the substance is excreted or degraded biologically. Biomagnification is the increase in concentration of a substance that occurs in a food chain as a consequence of: food chain energetics and low (or nonexistent) rate of excretion/degradation of the substance. Although sometimes used interchangeably with 'bioaccumulation,' an important distinction is drawn between the two. Bioaccumulation occurs within an organism, and biomagnification occurs across trophic (food chain) levels. (EC Sustainable Food Procurement Guidelines)



## UN CAFETERIAS, FOOD AND KITCHEN EQUIPMENT

Hormones are administered to livestock to improve growth rates, or production rates (for dairy cows). This practice is common in many parts of the world, however banned in Europe, due to concerns over the safety of the residues left in the meat and milk.

As well as causing potential harm to the health of consumers, hormones can disrupt the hormonal balances of other animals within the habitat of the livestock. Aquacultures are specifically at risk, as hormones excreted by livestock are washed through the soil and into watercourses where they can affect the breeding patterns and gender of fish.<sup>40</sup>

Routine use of antibiotics in intensive meat production is common and is undertaken for a number of reasons, as a preventative measure, to minimize animal illness, but also to promote growth (usually in chickens). Limited use of antibiotics for prevention of disease in plants also occurs, usually through spraying in orchards.

Antibiotics in animal excrement or by products (bonemeal/compost etc) can contaminate water sources.

Constant exposure to antibiotics (either in animals or humans) can stimulate a natural evolution in the bacteria that they are aimed at resisting.<sup>41</sup> The evolved versions of the bacteria are immune to treatment with those same antibiotics, and in some cases new antibiotic drugs have not been able to be developed to resist them, hence the nickname 'superbugs'.

### Genetic Modification

This is an area of ongoing debate. What constitutes genetically modified or not, is not 100% clear, as cross breeding, hybrids and natural evolution of species, are all activities that have taken place for hundreds of years, and all result in the change of the genetic make up of plants and animals.

Modern techniques allow for sections of gene patterns to be lifted from one variety of plant or animal and inserted directly into another, replacing the equivalent section in the recipient gene sequence or introducing new gene sequences that are not present in the organism naturally.

The benefits are often the same as those created by the natural versions of cross breeding and evolution, however, the results can be achieved much faster than through the natural methods, and may produce results that may not have occurred even with years of natural cross breed trials.

The problems with these techniques lie mainly in the unknowns. The effects of a 'super-evolved' breed or variety on an existing ecosystem, where all the other organisms have not had the chance to develop alongside the GM version, are very hard to predict, and may be irreversible. The long term impacts of speeding up the evolutionary process to such an extent and introducing these new strains into existing ecosystems are unknown.

In particular, the effects on the human body of consuming GM foods are also unknown.

Counterbalancing these environmental negatives related to GM foods are some significant positives, both for the environment, and for human welfare.

GM varieties are bred to resist drought, disease or predators, and to grow

<sup>40</sup> Raloff, Janet. "[Hormones: Here's the Beef: environmental concerns reemerge over steroids given to livestock.](#)" *Science News* 161, no. 1, January 5, 2002, 10.

<sup>41</sup> The Need to Improve Antimicrobial Use in Agriculture Ecological and Human Health Consequences, Select Findings and Conclusions, FAAIR Scientific Advisory Panel, Clinical Infectious Diseases 2002;34:S73–S75 Antimicrobial Use and Resistance in Animals, McEwan and Fedorka-Cray CID 2002;34 (Suppl 3) See also <http://www.tufts.edu/med/apua/index.html>

## UN CAFETERIAS, FOOD AND KITCHEN EQUIPMENT

larger/juicier/higher in certain nutrients. The aim is to reduce the need for additional agrochemicals and irrigation, and to increase the yields per hectare, as well as the quality and durability (shelf life) of the product. Some trials are aiming to produce Omega 3 rich soya oils, which are/were previously only available through fish and animal proteins. Soya is widely used in processed foods, and up to 77%<sup>42</sup> of this crop is thought to be GM. Avoiding GM requires avoiding most processed foods.

Given the potential for an impending global food shortage<sup>43</sup>, these positive traits are not to be overlooked lightly.

### 2.3 Waste

The outputs of the agricultural, food production and catering systems are not confined to useful foodstuffs. Both the volumes and the nature of the by-products and waste generated present environmental issues. Agrochemical waste issues have been considered above,<sup>44</sup> in this section food waste is considered, whilst refrigerant gases, packaging, and disposables are considered towards the end of the document, under section 4.

Food waste is generated at all stages of the food production process, from poor harvesting techniques, heat, water or pest damage at farm level, through to processing (e.g. rice bran or nut shells), manufacturing (e.g. skin or blemishes), distribution (e.g. damaged or unsold goods) and consumption (e.g. leftovers or unused products).

In the US waste food is estimated to amount to as much as 40-50% of total food production,<sup>45</sup> in Japan around 20 million tonnes of food is wasted annually (equivalent to Japan's total annual agricultural output), in Korea food waste accounts for over 27% of household waste. In Africa losses at the agricultural production stage can vary from 25% for cereal crops to 50% for fruit/vegetable crops, and in India this is lower but still amounts to 10-12% of cereal crops<sup>46</sup>.

World marine capture fisheries yield 110-130 tonnes of seafood annually, 30 million tonnes of this is discarded,<sup>47</sup> where it is approximated that as much as 70-80% of some species of fish are dead/die as a result.

Food losses for different food types vary, as demonstrated in the graph below:

<sup>42</sup> <http://www.isaaa.org/resources/publications/briefs/41/pptslides/default.asp>

<sup>43</sup> For more detail see: The Environmental Food Crisis, UNEP

<sup>44</sup> under Environmental Impacts – Modern Agriculture

<sup>45</sup> Asia Pacific Food Industry January/February 2010 'A 2<sup>nd</sup> Life for Waste' Augustine Quek

<sup>46</sup> The Environmental Food Crisis, UNEP

<sup>47</sup> The Environmental Food Crisis, UNEP

# UN CAFETERIAS, FOOD AND KITCHEN EQUIPMENT

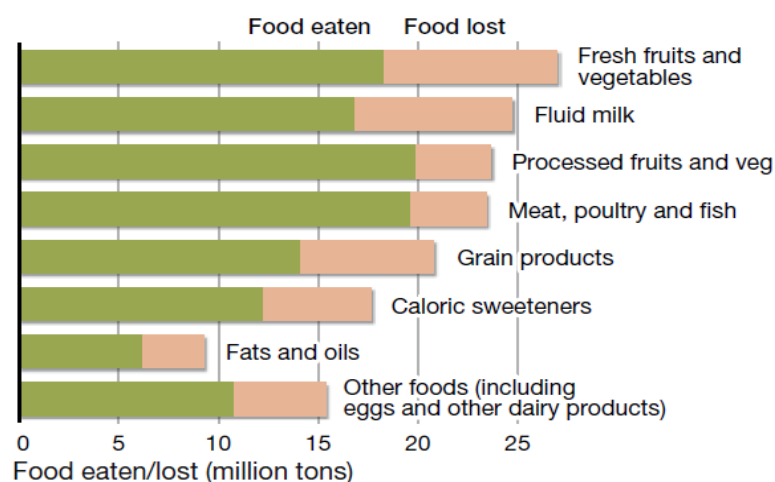


Figure 11: Food losses for different commodities.

48

## Minimisation

There are a number of options available for the management of food waste, however a combination of solutions is preferable, dependant on the nature and volume of food waste to be handled, as well as the availability of space or facilities (on or off site) of each of the waste handling systems.

## Animal Feed

Food waste can be used as animal feed in many parts of the world, (unless legislation specifically prohibits this) although is sometimes subject to sterilisation methods that require relatively high energy usage.

## Composting / Worm Farms

Some food waste can be converted into compost using anaerobic digestion (rotting in an oxygen free environment). This has a side effect of generating carbon dioxide and methane, which can be captured and burnt for fuel, but if capture is not possible/feasible, this gas release adds to climate change (see glossary).

Aerobic digestion (rotting in an environment with oxygen, sometimes with added heat and oxygen and or bacteria/yeasts/fungi), is also used to convert some food waste into usable fertiliser, soil conditioner or animal feed.

## Deep Frying Oils

Oils are still valuable, even when they have served their useful purpose for deep frying. They can be used, almost immediately (if filtered) as biodiesel, or otherwise in power stations or animal feed.

<sup>48</sup> Kantor et Al 1999, Estimating and Addressing America's Food Losses, American Journal of Agricultural Economics 81 (5): 1325-1325



## UN CAFETERIAS, FOOD AND KITCHEN EQUIPMENT

### *Fats, Oils and Grease*

Fats, oils and grease accumulate in various locations in kitchens and are notoriously difficult to remove. Traditionally surfactants, and highly toxic solvents and acids are used to clean and clear ventilation and drainage systems. An alternative solution is enzyme application<sup>49</sup>, through a constant dosage system, and/or in combination with a colony built up around a traditional grease trap (mechanical grease removal system used in kitchen drainage to capture grease).

### *Food Waste Disposers*

Food waste disposers (FWDs) are machines that grind up food waste and release it into the drain/waste water system.

This could be considered as a solution that simply 're-locates' the issue of dealing with the waste to the local waste water treatment centre. Other disadvantages include:

- Water usage in flushing food debris through the system
- Energy consumption to run (especially if not switched off automatically)
- Reduced effectiveness of bio-remediation (enzyme) fat, oil and grease handling systems
- Can encourage additional food waste due to ease of disposal

There are however considerable benefits of the system:

- No transport of waste
- No hygiene issues with waste storage
- Can encourage proper waste type separation
- Useful by-products at waste water treatment station – sludge / biogas etc<sup>50</sup>

FWG's can be combined with 'dewatering' machines, which remove the excess water, leaving a food sludge, which can be handled in any of the methods detailed above.

### *Rapid Decomposition*

Machines are available that create the ideal warm and damp conditions for decomposition of food waste, and couple this with enzymes, to speed up the process. The resulting waste liquid drains into the waste water outlet, with the associated benefits (as listed above under FWDs).<sup>51</sup>

<sup>49</sup> For further detail see <http://www.thefreelibrary.com/Bioremediation:+An+eco-friendly+solution+for+high-maintenance+drain...-a079826398> or <http://www.environmentalbiotech.com/>

<sup>50</sup> Energy Efficiency in Commercial Kitchens CIBSE TM50: 2009

<sup>51</sup> See <http://www.gohbio.co.uk/index.php> for further information.

### 3. Key Social issues associated with Food Production

#### 3.1 Workers rights, Pay and Conditions

Conditions are often poor for agricultural workers. Low wages and long hours are key problems. In Chile, in the fruit-picking sector, 75% of women work more than 60 hours a week in season, on temporary contracts, and a third do not earn even the minimum wage<sup>52</sup>.

Unrelenting poverty amongst farm workers is common, with wages, even when meeting with the national legal minimums, unable to provide sufficient food, clothing and medicine for a family, where both parents work. Coffee growers often do not receive a price for their coffee that allows them to cover production costs, let alone look after basic needs for their families<sup>53</sup>.

Reliance on national labour regulations<sup>54</sup> and the enforcement of these is unfortunately not sufficient within the agriculture industry. Whilst accurate information detailing breaches of legislation is hard to find, an Ethical Trade Initiative impact report refers to persistent problems found in the course of its research on fruit farms in South Africa and Costa Rica<sup>55</sup>.

It is noted that these issues are not exclusive to developing countries. The UK (and other developed countries) also have problems of (often migrant) workers being exploited, with compulsory provision of accommodation, irregularities in payment and lack of comprehension by workers of their rights due to language barriers.

#### *Child Labour*

246 million children worldwide are involved in child labour, of which 70% is in the agricultural sector, where they can be exposed to agrochemicals, long hours, and unsafe conditions<sup>56</sup>. Not all children working in agriculture are at risk, however there are enormous difficulties in establishing data in this area, as families work together, and payment is often based on volumes, rather than hourly rates.

Forced and unsuitable child labour is reported frequently on cocoa farms in West Africa. Whilst chocolate companies worldwide signed a protocol, in which they committed to eradicating 'the worst forms' of child labour,<sup>57</sup> little impact has been made.

<sup>52</sup> [http://www.oxfam.org/en/campaigns/trade/real\\_lives/chile](http://www.oxfam.org/en/campaigns/trade/real_lives/chile)

<sup>53</sup> Mugged, Poverty in your Coffee Cup, Oxfam International 2002

<sup>54</sup> Details of minimum wages and maximum working hours are available on the ILO site - [http://www.ilo.org/dyn/natlex/natlex\\_browse.home?p\\_lang=en](http://www.ilo.org/dyn/natlex/natlex_browse.home?p_lang=en)

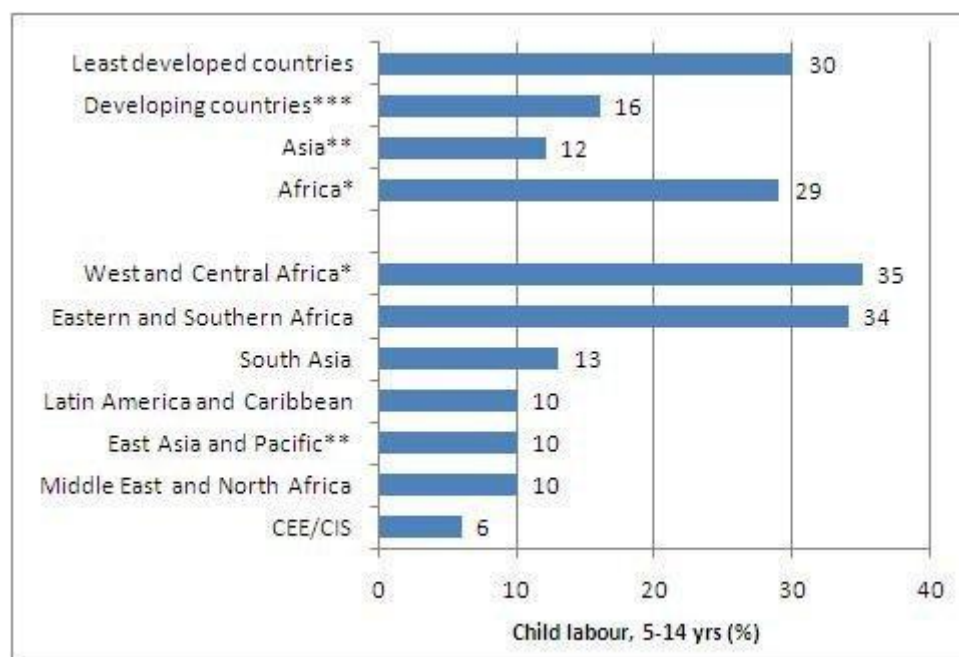
<sup>55</sup> Ethical Trade Initiative Impact Assessment Report 2006

<sup>56</sup> <http://www.ilo.org/ipecc/areas/Agriculture/lang--en/index.htm>

<sup>57</sup> According to the ILO conventions

# UN CAFETERIAS, FOOD AND KITCHEN EQUIPMENT

Children aged 5–14 engaged in child labour (%), by region (1999-2008)



\*Excludes Nigeria

\*\* Excludes China

\*\*\* Excludes Nigeria and China

Source: NICEF SOWC 2010 - Table 9 (Child Protection) of UNICEF's annual publication *The State of the World's Children*.

## Workers Health & Safety

Poorly maintained machinery, use of agrochemicals, noise and dust, as well as lack of training, cause a high frequency of accidents and illness amongst workers. There are as many as 2 million deaths annually from work related illness and injury<sup>58</sup>.

Kitchen and agricultural machinery is inherently dangerous, and injury rates are increased due to frequent instances of lack of protective equipment, poor maintenance and lack of proper training for users. Injuries can vary from minor burns to loss of limbs and extend to fatalities. Repetitive bending and/or lifting of heavy items are causes of back injuries, common within the food growing and production industries.

Workers and local communities are exposed to agrochemicals for a variety of reasons: partial, inadequate or complete lack of personal protective equipment; spills during mixing, spraying, and/or loading of the pesticides; poor storage and disposal practices; and spraying against the wind, which facilitates spray drift. Also, it is common to find empty containers in the agricultural fields. Water is contaminated by chemical runoff and by washing equipment in local water bodies. As many as 90% of workers show symptoms of pesticide poisoning in some areas<sup>59</sup>.

A lack of adequate lighting, in pack houses and kitchens can cause headaches and damage to sight, as well as adding to instances of accidents.

The International Labour Organization and the Ethical Trade Initiative are the two key international organizations advocating on behalf of workers subject to unsafe, inhumane and unfair working conditions.

<sup>58</sup> World Health Organization, *The Seoul Declaration, Why it Matters for Global Public Health*,

<sup>59</sup> *Communities in Peril*, Asian Regional Report on Community Monitoring of Highly Hazardous Pesticide Use, Pesticide Action Network (Pacific & Asia Division) 2010

# UN CAFETERIAS, FOOD AND KITCHEN EQUIPMENT

## 3.2 Fair Pricing

### *For Workers*

As discussed above, agricultural workers, especially in developing countries, often do not receive wages for their work that allow them to support themselves and their families. This issue extends to workers throughout the food production chain, right into the kitchens of facilities such as those found in UN stations worldwide. National legal minimum wages are often insufficient to provide workers with homes, food, medical care and a minimal level of disposable income.

The concept of a 'living wage' has been developed and calculated, on a by city basis for some cities in Europe and the US<sup>60</sup>, however figures are harder to find or establish in developing countries. Key indicators that workers are not receiving a living wage are parents missing meals (usually in order to ensure children eat), or working excessive overtime voluntarily.

### *For Suppliers*

For growers, the issues of receiving low prices for their goods are the same as for the workers receiving lower than 'living' wages, essentially poverty and sometimes hunger. In addition, in the case of those producing the crops and livestock, this may also mean that they may not be able to continue producing in the following harvest. Often, farmers will have to sell their entire crop, leaving insufficient stores as seed grain for the following year. This is the most basic form of unsustainability, as it results in a total lack of production over time.

Further along the chain, and in developed countries, the issue of payment terms is also critical. Many successful and sustainable businesses can be bankrupt or severely disrupted in their operations due to cash flow problems. Larger companies, in the position of client or buyer, are often in a position of power, leaving the supplier (or grower) with little bargaining power to ensure that they get paid on time, or within a time frame that their business can support.

### *For Customers*

Often, ensuring that the environmental and social impacts of food are addressed can increase the final selling price of food and food service to end consumers. Whilst, arguably, this re-alignment of the cost of food as a percentage of income does need to happen long term, as with all changes, it must happen gradually to ensure its success. It is important then that an assessment of viability is made each step of the way, allowing the consumer market to adjust to the necessary changes that happen within the industry.

Customers must also be free to make personal choices relating to whether to buy sustainably or not. Whilst the UN seeks to set an example to its employees and other organizations, it cannot dictate choice entirely.

Customer tariffs must not reach levels where employees within UN catering facilities cannot reasonably afford to eat there and staff footfall moves to alternative, less expensive catering and food options, thus making the internal operation unsustainable in itself. For instance, prices could be different for interns and volunteers.

---

<sup>60</sup> <http://www.londoncitizens.org.uk/livingwage/index.html> / ; <http://www.livingwage.geog.psu.edu/>

## UN CAFETERIAS, FOOD AND KITCHEN EQUIPMENT

### 3.3 Religious Requirements

Religion and food are very closely linked, with so many important religious festivals and rituals being marked by food, or the lack of it. The needs of each group of individuals should be respected as much as possible in the growing, processing and serving of food.

At work, individuals should not be discriminated against on the grounds of their religion, or religious requirements. Breaks times should be flexible to allow for prayer or the breaking of a fast, for example, and where practical and safe, uniforms and equipment should be adaptable to allow staff to follow their religions.

### 3.4 Health & Nutrition of Consumers:

Having established that food is a precious commodity, the need to keep it safe for consumption, avoiding waste, food poisoning and the ingestion of unwanted by products is extremely important. Contamination and spoilage are the two processes which render food unsafe to eat. The World Health Organization estimates that over 2 million people die annually from food and water borne disease<sup>61</sup>.

The risks associated with unsafe food vary from illness to fatality, but are increasing due to the global supply chain, the distances food is transported, the length of time between harvest and consumption, the large scale food processing that can result in any food safety issues becoming very widely spread very quickly and easily. In addition the numbers of people with weaker immune systems, who are more susceptible to food borne illness, are increasing with ageing populations, and advances in medicine.

Ensuring a balanced diet, and the consequences of failure, are amongst the most dramatic health problems faced by the global population. Whilst knowledge about the nutritional and calorific needs of the world's population is growing, the ability to deliver what is required is conversely, decreasing.

#### *Spoilage and Food Poisoning*

Naturally occurring levels of bacteria in fresh food will multiply when exposed to warmth, moisture and food, and can become harmful to humans at the higher levels created. The most common of these are salmonella, campylobacter and E-coli. These food poisonings, as well as causing discomfort and distress to those suffering, can have significant economic impacts in terms of lost productivity and medical bills.

#### *Natural Toxins*

It is also worth noting that not all flora and fauna are suitable for human consumption and that a not insignificant number of food poisonings occur annually due to the ingestion of some varieties of mushrooms, fish and other plants.

Metals, particularly mercury and lead can accumulate in the food chain, and cause poisoning when consumed. Acidification increases this problem, releasing metals into the water and soil, where it is absorbed by plants and animals, and passes up the chain.

---

<sup>61</sup> WHO Global Strategy for Food Safety, Safer Food for Better Health, WHO 2002

# UN CAFETERIAS, FOOD AND KITCHEN EQUIPMENT

## *Contamination*

Other substances that are added to food, intentionally or otherwise, can be, or may be harmful to human health. Small unwanted items / non food items can also find their way into food, and cause harm. The individual effects of some key contaminants are considered in turn below. The combined effects of many of these substances are cause for even greater concern, largely as the long term effects of individual chemicals and various combinations are chiefly unknown.

## *Agrochemicals*

Exposure to pesticides, in the field, for workers, in the surrounding area and on crops during processing and consumption, can be dangerous to health. Of 3 million people affected annually by direct contact with pesticides on the farm, 220,000 people are killed globally each year by pesticides incidents<sup>62</sup>.

Various studies have noted that constant exposure at high levels (through working on or close to farms), and low level constant exposure, through the consumption of treated crops, or livestock having been fed on treated crops, can have various health impacts. Noted risks vary from respiratory, developmental, reproductive, immune system disruptions, as well as increased risk of cancer. Due to the number of other environmental factors which can impact on the development of all of these health problems, pinpointing any one particular agrochemical is often complex. The results of specific studies, where conducted, can be startling, such as an increased risk of developing Parkinson's disease of up to 70% increase<sup>63</sup>.

## *Antibiotics*

Antibiotics are passed onto humans through the food chain, by consumption of the meat, eggs or dairy produce from treated animals. As detailed above (see 'Environmental Impacts'), antibiotic use in agriculture can cause the evolution of various bacteria, resulting in an immunity to existing antibiotics. Illness caused by hormone use in dairy cows (see below under Animal Welfare) is also compounded by the resultant use of antibiotics for treatment.

## *Hormones*

Concerns about hormone use in livestock and dairy (usually only cattle) are due to the potential for disruption to the balance of hormones in the human body which can cause developmental problems, breast, prostate and colon cancer.<sup>64</sup>

## *Additives (Colours, flavours and preservatives)*

Once food has been changed from its original state, by chopping, cooking, or the introduction of water, it usually deteriorates much faster. In order to slow this process, food additives are often added to preserve or enhance flavour or freshness. These additives may be relatively natural, such as citric acid (lemon juice) or sodium chloride (salt), or more complex chemicals.

Some additive uses are surprising, such as the addition of artificial colourings to fish feed to colour the flesh of farmed salmon.

<sup>62</sup> Acute Pesticide Poisoning, A Major Global Health Problem, World Health Statistics, Vol 43, No 3, 1990

<sup>63</sup> Pesticide Exposure and Risk of Parkinson's Disease, Annals of Neurology, Vol 60, No 2, August 2006

<sup>64</sup> World Trade Organization. "United States — Continued Suspension of Obligations in the EC — Hormones Dispute." Dispute DS320 Settlement Summary, updated June 2, 2006.



## UN CAFETERIAS, FOOD AND KITCHEN EQUIPMENT

In Europe, all food additives are tested, and once registered safe, are given an E number.

Not all E numbered additives are 'un-natural' chemical compounds, natural flavourings, and even beeswax (E901) have to be tested and regulated, therefore are allocated an E number.

Knowledge of the effects of food additives on the human body, and eventually on the global ecosystems, is relatively limited, but some additives have been associated with behavioural problems (especially in children), infertility, increased instances of allergies and increased severity of allergic reactions.

Artificial additives, have been linked to health problems after being released into the marketplace. Ongoing testing can result in allowed additives being later banned, such as E128 due to proven links with cancer<sup>65</sup>.

Processed foods are the most prolific users of additives.

Processed foods often have vitamins and minerals added to them, either to replace those lost in processing, or as a marketing point of difference from competitors, or as required by law. In some cases this can make processed foods more nutritionally beneficially sound than the original, fresh, whole foods that they originated from. On the other hand, processing foods can reduce or remove vitamins that are present in the fresh foods, and where these are not replaced, it can result in a lower quality (nutritionally) product. The presence of whole foods is also rare within processed foods, as the skins, piths, cores, peels, shells, husks, gristle and other less desirable parts of foods are usually discarded in the processing. These parts of foods sometimes contain vital vitamins or minerals, usually provide fibre, and also provide bulk to the diet, all useful attributes which are lost through processing.

The prevalence of cheap, often processed, high fat, salt and sugar foods, replacing balanced meals, are a key part of the issue.

### *Water*

Whilst not strictly falling within 'food', water is usually indivisible from food, in terms of provisionment of basic needs. Failure to gain access to safe, clean water is the most important concern for very many communities worldwide. As noted above, the instances of illness and fatalities due to water borne illness remain very high.

### **3.5 Animal Welfare**

Whilst this may not at first appear to be a social issue, the handling of animals can also be reflective of the broader morals of any given culture. Further to this, evidence to prove human health benefits of eating healthier animals was highlighted by the BSE/vCJD crisis of the mid 1990s<sup>66</sup>. Other issues are detailed under the Health & Nutrition section of this report.

Most animals, naturally, live in small groups, and range over relatively large areas to forage for a naturally varied diet. The high demand and competition in price for meat and animal products has however led to the development of faster, and less space and time confined methods of animal rearing.

<sup>65</sup> Explanatory Memorandum to the Food (Suspension of the use of E128 Red 2G as Food Colour) Regulations 2007 No 2266

<sup>66</sup> [www.who.int/mediacentre/factsheets/fs113/en/](http://www.who.int/mediacentre/factsheets/fs113/en/)

# UN CAFETERIAS, FOOD AND KITCHEN EQUIPMENT

Intensive animal farms use a variety of techniques to ensure maximum gains:

- Small areas / high stock densities
- Breeds selected for weight gain/milk/egg production rather than animal or human health, quality or flavour
- Growth stimulants (antibiotics, longer 'daylight' hours, hormones)
- Little or no bedding
- Extreme confinement such as cages for laying hens and farrowing crates for sows<sup>67</sup>
- Tail docking, castration and killing of male dairy calves
- Long distance transport to rapid processing slaughter and packing houses

The lack of space or natural environment prevents animals from exhibiting their natural foraging behaviour. As a result hens often peck at each other, pigs chew each other's tails or the bars of the enclosures. Confined spaces result in high instances of illness, as well as stress, and injury.

## Hormones

Further to the issues with human and other animal health associated with hormone use in dairy and beef cattle, the rBGH hormone which is administered to dairy cows to increase milk production, has also been anecdotally shown to cause numerous health problems for the cows receiving the hormones.

Increases in the number of cases of mastitis (infection of the udder), sores, hoof diseases,

and even internal bleeding have been reported. A fundamental problem is also that cows can struggle to consume sufficient nutrients to produce the volumes of milk, and therefore essentially starve their own systems of nutrients to produce the milk, leading to a weakened system unable to resist infection or disease<sup>68</sup>. Often illness results in the administration of antibiotics.

## Antibiotics

The same issues arise in treating evolving bacterial infections or illnesses in animals as detailed above in relation to human health. This issues is magnified by the fact that the animals are the closest to the bacterial sources where infections grow (manure in intense livestock rearing farms), and are the primary consumers of the antibiotics.

Often antibiotics are used to control disease where better stock management and buildings could have been used a preventative measures.

## 3.6 Diversity

There are historical imbalances in the number of female and ethnic minority workers and suppliers, as well as imbalances in the pay and rights of these groups. Age discrimination can also be prevalent.

<sup>67</sup> For further information see [www.ciwf.org.uk/farm\\_animals/default.aspx](http://www.ciwf.org.uk/farm_animals/default.aspx)

<sup>68</sup> Harris, Barney. "[Energy Intake and Dairy Cow Fertility](#)." University of Florida Extension Dairy Production Guide, Fact Sheet DS 45, August 1992.

Hansen, Michael, Jean M. Halloran, Edward Groth III, and Lisa Y. Lefferts, *Potential Public Health Impacts Of The Use Of Recombinant Bovine Somatotropin In Dairy Production: Prepared for a Scientific Review by the Joint Expert Committee on Food Additives*, September 1997.

Kastel, Mark, "[Down on the Farm: The Real BGH Story Animal Health Problems, Financial Troubles](#)." Rural Vermont, 1995.<http://www.sustainabletable.org/issues/hormones/>



## UN CAFETERIAS, FOOD AND KITCHEN EQUIPMENT

### 4. Implementing the Sustainable Procurement Guidelines in UN Cafeterias

#### 4.1 Solutions for more sustainable UN cafeterias

##### *Menu Planning*

An important area for changes that can be made to the sustainability of the catering operation are made through the food procurement process. Selecting the most sustainable ingredients to work with has significant impact. These decisions are made when menus are planned. This responsibility is often with the chef, demonstrating the importance of training and development in sustainable food procurement for chefs. Both institutional menu planning policies and practical assistance for chefs are required to reduce the environmental impacts of a menu.

The factors that have to be considered when menu planning are fairly complex. Cost, preparation time, kitchen skill, storage, wastage, kitchen equipment, health and consumer demands to name a few must all be taken into consideration. The factors that should be added to this are, increasing carbohydrate based meals reducing meat, fish and dairy content, using available local and seasonal goods where produced sustainably, limiting processed foods and the use of eco-labelled or equivalent goods. Restricting ingredients to those available from more sustainable sources when menu planning, rather than planning a menu and then looking to source sustainable ingredients, is the preferable option.

##### *Organic*

International definitions of organic are outlined by the Codex Alimentarius (developed by the World Health Organization and the Food and Agricultural Organization) and by the International Federation of Organic Agricultural Movements (IFOAM).

The key principles behind organic farming are health, ecology, fairness and care. More specifically organic farming requires the following:

- Minimized agrochemical input
- Protection of ecosystems, including maintenance of soil health
- Avoidance of antibiotics, no hormones
- Natural animal behaviour and good welfare standards
- Organic feeds
- Minimal waste and water efficiency
- Breeds and varieties to support all of the above

In most countries a legal definition of organic also exists. Independent certification schemes, each with their own definitions and criteria exist globally, many of whom are members of International Federation of Organic Agriculture Movements IFOAM. The European Commission has specified a Europe-wide definition of organic

## UN CAFETERIAS, FOOD AND KITCHEN EQUIPMENT

The variances between different international, legal and independent definitions are too great in number to be considered in this document, but are mainly concerned with the specifics of certain crops, agrochemicals or systems, with the fundamental aims and benefits of organic agriculture being assured by all definitions. A useful source of data relating to organic labeling may be found at <http://www.globalecolabelling.net/>

In order to address each of the environmental issues above, a complete review of the procedures and processes in place throughout the Cafeterias and catering operations is required in addition to the adaptation of the food procurement approach. The procurement of food is -in fact- only a starting point, the benefits of which need to be strengthened by institutional change throughout the chain of staff linked to the catering operations, as well as the facilities and equipment used.

In addition to the focus on environmental protection, organic farming also seeks to improve the ethics in food production and processing. The principles of fairness and care in business are fundamentals of organic farming.

The social issues outlined in the previous section are addressed within the recommendations set out by IFOAM with regard to social justice. Whilst recommendations are not mandatory, they do indicate the aspirations of organic farming, and exist in addition to the minimum standards which require that there are no violations of basic human rights, that there is no forced labour, that there is the right to associate, that there is equality in the workplace, and that child working is limited to that which will not harm their health or well being.

### *Fairtrade*

Fairtrade is a trading partnership, based on dialogue, transparency and respect, which seeks greater equity in international trade. It contributes to sustainable development by offering better trading conditions to, and securing the rights of, marginalized producers and workers -. Fair Trade organizations (backed by consumers) are engaged actively in supporting producers, awareness raising, and in campaigning for changes in the rules and practice of conventional international trade.

Whilst the scope of products available under Fair Trade certification schemes are growing, the first targets for conversion to Fair Trade are coffee, sugar, bananas and chocolate.

### *Knowledge, relationships and change between producers and buyers*

As with environmental factors, local sourcing allows buyers to determine exactly how produce is grown and traded, and make decisions accordingly.

Advertising for supply in local press, and communicating opportunities through other channels (word of mouth, local notice boards etc) to ensure that smaller and more local suppliers are aware of the opportunity is crucial to finding and using alternative suppliers.<sup>69</sup>

## **4.2 Sustainable Facilities and Equipment**

Heating / cooking, cooling and lighting, as well as mechanical food preparation are all energy intensive processes undertaken in kitchens.

Further to this, as with all building designs, the materials selected for the fixtures and fittings in catering areas all have their own environmental, ethical and financial 'footprints', which can be considered.

---

<sup>69</sup> Buying a better world –Sustainable Public Procurement, Forum for the Future 2007

# UN CAFETERIAS, FOOD AND KITCHEN EQUIPMENT

## *Kitchen Design and Equipment Choices<sup>70</sup>*

In designing the facilities, a number of factors should be taken into consideration to ensure the maximum efficiency of the operation. Due to the interrelationships between the various components of the kitchen, including workflow, health and safety, food safety and sustainability, it is recommended that a specialist consultant be employed to assist in the design of kitchen areas<sup>71</sup>. Below are some initial guidelines, highlighting some of the key considerations in sustainable kitchen design. Many of these recommendations can also be implemented unilaterally.

Refurbishment or replacement of equipment should be used as an opportunity to install meters or sub meters, which will allow for ongoing monitoring and increased awareness of energy usage.

Re-usage of existing equipment is fundamentally sound, but should be considered in the whole picture, including the likely higher running costs. If reused, equipment should be fully serviced to ensure it is running at maximum efficiency.

Designs can take into account the natural local environment in the following situations:

- Positioning windows / light tubes for natural lighting
- Positioning windows, vents or solar chimneys for natural ventilation
- Positioning storage areas against north facing walls

and should also consider other equipment and processes:

- Locating heating and cooling equipment remotely from one another
- Locating chilling equipment close to good ventilation systems or natural airflows (doors / airbricks)
- Protecting heat sources from drafts
  
- Locating chilled and frozen storage close to point of delivery
- Sizing to meet delivery and stock usage patterns
- Matching ventilation hoods to equipment<sup>72</sup>
- Matching saucepans to hob sizes and food volumes

In terms of selecting new kitchen equipment, the available market supply will dictate what is the most sustainable option in each case dependant on the following factors:

- health and safety
- ability to avoid harmful substances in manufacture
- reduce energy consumption in usage
- minimize maintenance and consumables
- have the longest life span
- offer the highest potential for recycling / minimal damage in disposal at the end of its useful life

<sup>70</sup> The information in this section is primarily summarised from Energy Efficiency in Commercial Kitchens CIBSE TM50: 2009

<sup>71</sup> A list of consultants is available on [www.fcsi.org](http://www.fcsi.org)

<sup>72</sup> Split ventilation hoods may be more efficient where some equipment is rarely used and other items are frequently in use

## UN CAFETERIAS, FOOD AND KITCHEN EQUIPMENT

Sometimes alternative products can offer a more sustainable solution. Some of these types of products are highlighted below:

- fridge or freezer drawers – allowing fast access to items without the whole chiller being exposed to ambient air temperature
- solar chimneys – utilise natural convection currents to draw cool air into the building and expel hot air
- light tubes – convey natural light through the roof into a room via a mirrored tube
- heat recovery systems – using hot air in hood ventilation systems to heat clean air or water<sup>73</sup> Reduced energy consumption in usage is often significantly improved by the use of thermostats and sensors. Movement sensors for lights in storage areas and hand washing taps in hand wash basins and toilet areas, accurate thermostatic controls on ovens, refrigeration equipment, ventilation hoods and for room heaters, timers for display lighting and room heaters.

Selecting appropriate equipment for the task also has a very large bearing on energy usage.

### *Life Cycle Cost Analysis*

Capital expenditure on heavy catering equipment and front of house furnishings will represent a large expenditure within any General Services or Estates department. Life cycle analysis of equipment costs, both financially, and in terms of environmental and social impacts, is key to the overall sustainability of the catering operation.

Life cycle analysis can be a complex mechanism, dependant on the scope of the 'life' of the product being examined. This can extend as far back as the extraction of raw minerals required for the manufacture of the equipment, right through to the eventual disposal and recycling potential of the item at the end of its useful life.

Within the catering industry, the most common 'start' and 'finish' to the life cycle analysis that can be usefully (and economically in terms of time and cost to calculate) employed is from purchase to disposal, and includes energy and component usage throughout this period, as well as purchase, delivery, maintenance and disposal costs.

A higher initial purchase price can often be compensated for by lower long term maintenance and particularly, running costs, delivering a sustainable solution in terms of financial and environmental benefits.

There are various 'calculators' available to assist in determining which products have the lowest life cycle cost from a selection of competing products<sup>74</sup>.

<sup>73</sup> Most effective where a bank of cooking equipment is used, as typically 65% of the energy will be lost to the ventilation hood via convected heat, 5% will transfer into the food and 30% will be radiated into the kitchen space) – Energy Efficiency in Commercial Kitchens CIBSE TM50:2009

<sup>74</sup> Total Cost of Ownership Calculator [www.nafem.org](http://www.nafem.org) or [www.astm.org/standards](http://www.astm.org/standards) or [www.lccalculator.com](http://www.lccalculator.com) or [msr.se/en/green\\_procurement/LCC](http://msr.se/en/green_procurement/LCC)

# UN CAFETERIAS, FOOD AND KITCHEN EQUIPMENT

## *Refrigeration*

In refrigerated display equipment, the removal of items to a closed and insulated fridge at the end of service (and turning off of the display chiller), and the use of insulated curtains overnight for merchandisers reduces energy consumption. Compressor units operate more efficiently when located in cooler areas (outside/out of direct sunlight), and should not be located too close to one another, or in vertical banks. Refrigeration equipment may have one or more of the following energy saving devices:

- automatic defrost
- climate class (look for 4 or 5)
- fan assisted refrigeration
- automatic fan cut out
- self closing doors
- heavy duty door closing gaskets
- energy efficient fans
- high density insulation
- door open alarm
- evaporators
- microprocessor temperature control

Equipment produced prior to 1989 was largely dependent on ozone depleting gases (in liquid form) such as chlorofluorocarbons (CFCs) and bromofluorocarbon compounds/halons for refrigerant qualities.

These chemicals, once released (in their natural state as gases), break down chemical compounds in the ozone layer of the atmosphere<sup>75</sup>. The use of these chemicals was phased out by the Montreal protocol.<sup>76</sup> The latter prevents the use of listed ozone depleting gases in new equipment manufacture and to top up refrigerant fluid levels in existing equipment. New equipment may now contain a variety of alternative refrigerants, all of which are 'ozone safe'. Careful disposal of existing refrigeration equipment is essential, to avoid the release of the older gases.

## *Ware Washing Equipment*

Water usage in commercial kitchens is on average 7 litres of potable water and 6 litres of hot water per meal. Efforts to reduce this can include:

- automatic sensors for hand washing sink taps
- low water usage pre-rinse sprays
- low pressure or aerating taps
- water treatment equipment for hard water areas
- grey water reuse
- foot operated controls
- supply of sink plugs
- equipment maintenance (in particular washers)

<sup>75</sup> The thinning, and in some cases holes, formed in the ozone layer allows certain, harmful frequencies of UV light to penetrate the atmosphere. Harmful UV light is associated with increased instances of cataracts and skin cancer as well as plant damage, and reduced plankton populations in some parts of the ocean, are amongst the resulting problems.

<sup>76</sup> <http://www.unep.org/OZONE/pdfs/Montreal-Protocol2000.pdf>

## UN CAFETERIAS, FOOD AND KITCHEN EQUIPMENT

Again, ensuring that equipment is sized and specified appropriately to meet the needs of the facility is key, but other energy saving measures may include:

- smaller hot water holding tanks
- reduced rinse volumes or water recapture
- heat insulation
- self cleaning cycles
- enclosed drying systems (to reduce steam escape and consequent ventilation requirements)
- heat recovery systems
- automatic shut down
- efficient filtration

### *Cooking Equipment*

Cooking equipment, again should be selected for appropriateness to the task in hand. Other energy saving considerations are:

- installation of two smaller appliances rather than one larger one
- warning lights to remind users to switch off
- standby modes and automatic switch off
- robust closing mechanisms for oven doors
- premix gas and air combustion for gas appliances
- short start up times
- automatic fan switch off on door openings for ovens
- heat recapture for internal water heating (combination ovens)

Induction cooking is considered the most energy efficient hob method due to the direct heat transfer to the food and automatic switch off system.<sup>77</sup>

Environmental performance in new construction and refurbishment projects can be assessed using a number of different tools<sup>78</sup>.

Maintenance is crucial to the ongoing efficiency of kitchen equipment, with worn washers, clogged filters and damaged door closing mechanisms and seals being the top three issues, all resulting in higher energy loading requirements to maintain the same output from equipment. Consideration should be given to the need to procure kitchen maintenance as part of, or simultaneously to the equipment supply.

<sup>77</sup> See Energy Efficiency in Commercial Kitchens CIBSE TM50: 2009

<sup>78</sup> For further detailed information see [www.breeam.org](http://www.breeam.org) [www.dreamassess.com](http://www.dreamassess.com) [www.ceeequal.com](http://www.ceeequal.com)



# UN CAFETERIAS, FOOD AND KITCHEN EQUIPMENT

## *Staff Equipment Training*

Energy efficiency in kitchens can be significantly reduced by correct and energy aware usage of equipment. The absolute basics that should be incorporated into staff training are:

- switching on and off of major appliances
- adjusting the workloads of those appliances to suit the needs of the task in hand. Where this is left to staff, constant changes are often overlooked in favour of the simpler option of turning equipment on at maximum capacity and leaving it that way
- Not leaving taps running to defrost food
- Batch cooking can reduce food waste by 17%<sup>79</sup>

## **4.3 Cleaning, Furniture and Office Materials**

Please refer to the separate documentation on cleaning, furniture, and stationary, available at <http://ungm.org/SustainableProcurement/toolsUN/tools.aspx>

## **4.4 Packaging and Disposables**

The perishable nature of food, combined with the need to maintain high levels of hygiene throughout the supply chain, results in large volumes of packaging being used throughout the food supply chain.

In addition to this, once ready for consumption, the plates, bowls, cutlery and glassware that we use are often also 'temporary packaging' and designed to be disposable.

The environmental impacts of the packaging and disposable tableware items start with the use of resources in the production of the materials, and follow with the issue of disposal, due to both the volume and nature of the items.

Plastics, films and wraps constitute the majority of food packaging and disposables, closely followed by paper and cardboard. As with food, packaging and disposables require resource use in their production, supply and disposal. Packaging increases the size and weight of food loads to be transported, and the waste generates a further requirement for transport to landfill (or recycling facilities where these exist).

Disposing of waste in landfill sites can cause water pollution through leakage, odour emission issues and the release of GHGs (in particular methane). Fundamentally it also takes up space which could be used for more productive and useful activities.

Incineration can release heavy metals (mercury, cadmium, lead), and toxic 'products of incomplete combustion'<sup>80</sup> into the atmosphere, which then contaminate the ecosystems into which they are transported by air or water circulation systems.

Solutions, each addressing different parts of the packaging and disposables problem include alternative materials and recycling, as well as changing consumer (both procurer and end user) habits.

The most common approach to the reduction of waste, in all areas, is to reduce, reuse and recycle. Whilst this section focuses on actions that can be taken within the catering operation, changes can also be instigated further up the chain by speaking to suppliers and requesting that they consider making changes based on the same principles.

<sup>79</sup> Energy Efficiency in Commercial Kitchens CIBSE TM50: 2009

<sup>80</sup> For further detail see Europe's Environment, The Dobris Assessment, 1995, European Environment Agency

## UN CAFETERIAS, FOOD AND KITCHEN EQUIPMENT

Reducing the usage of disposables is relatively straightforward; simply encouraging the use of reusable crockery and tableware by providing that option as standard, rather than the disposable option is the first step. Sandwiches and salads in particular should be provided on plates as standard, and then in take away containers as a secondary option.

Beneficial side effect of encouraging the use of re-usable crockery is that people may be more inclined to consume their purchases in the dining areas, reducing cleaning requirements throughout the rest of the building, and increasing productivity by ensuring workers take a break. Allowing users to take table wear away from the dining area by leaving a deposit will also reduce disposables usage.

The next step is to discourage users from taking multiples of items, for example, by using napkin dispensers dispensing one napkin at a time, and ensuring that cups are of the correct thickness to be safe and stable when filled with the intended drink (too thin plastic cups for hot drinks are too hot to hold and result in people taking two or three as insulators – cardboard insulators or thicker cups would be preferable).

When selecting packaging or disposables, aim to use the lightest and most minimal possible. A simple paper wrap may suffice for a sandwich, rather than a complex box system.

Completing the recycling loop by choosing recycled materials is also very important. The most common items in a foodservice context are recycled paper napkins, kitchen towel, and bags and cardboard sandwich boxes and hot beverage cups.

Investigate the alternative materials now available for packaging and disposables in some locations is recommended as well. Fruit acids and corn starch are now being used as alternatives to oil for creating plastic like films and containers. As well as reducing the pressure on fossil fuels, these 'plastics' are biodegradable, compostable and in some cases recyclable. Similar (non transparent) products are being made from potato and other starches, although the added pressure on agricultural production to supply the raw materials for these is arguably a new environmental issue in the making (as for biofuels). In some instances, however, the starch can be a waste product from other food processing (potato starch in crisp and chip manufacture for example) making these products a truly sustainable solution. Bamboo, which is extremely fast growing, is also used to make disposable table wear. Where wooden and new paper items are chosen, these should be sourced from sustainable forests.

One of the most common packaging items is the water bottle. Where on site filtration is not possible, drinking water should be procured in the largest possible containers for internal distribution, with individual sealed water bottles a last resort.

### 4.5 Waste

As above, minimizing volumes of all waste types is crucial. Once those packaging and disposable items become waste, both weight and volume are extremely important. Disposal methods include recycling, incineration and landfill, each of which is discussed above (under environmental impacts).

Prior to this point, waste can be compacted, crushed and bailed, in order to reduce the amount of space that it takes up in storage, and more crucially, in transportation.



## UN CAFETERIAS, FOOD AND KITCHEN EQUIPMENT

### 4.6 A Key Driving Force: People

From agricultural and food processing workers, to contract managers and kitchen assistants, food production and catering services remain very people centric industries. The energy and motivation of people in the industry and in the duty station can be harnessed to make meal production and consumption in UN cafeterias a more sustainable and enjoyable experience.

#### *Green Cafeteria Champions*

Find at least one person within the duty station food service team willing to act as the sustainable catering champion. They will require support from the Duty station management team to implement ideas provided in this background document, or from their or from UN sustainable initiatives.

#### *Communication*

Communicating actions taken, as well as sharing knowledge will help develop better understanding of the issues and options associated with sustainable food and catering. Suppliers, employees, employers and consumers, as well as colleagues all need to be part of the communication process. Information materials and good food labelling delivered by the onsite caterer are the first and easiest means of communicating good food sustainability practices which are in place. Workshops, training days, newsletters and meetings are also good vehicles to focus attention and disseminate knowledge; these could be delivered by the onsite caterer.

#### *Staff Training*

Understanding the drivers behind the changes made is important at all levels. This document gives a brief overview and some key starting points, although developments in catering, agricultural production, and food processing are constant. A Commitment to ongoing learning and training within the food operations from the incumbent caterer is required.

