

COUNTRY REPORT ON FOOD WASTE IN ITALY

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1. Introduction to the Country

Geography

Area: 301,225 sq. km. (116,303 sq. mi.);

Cities: Capital--Rome (pop. 2.8 million, 3.7 million metro). Other cities--Milan (1.3 million, 3.9 metro), Naples (975,000, 3 million metro), Turin (900,000, 2.1 million metro).

To the north, it borders [France](#), [Switzerland](#), [Austria](#), and [Slovenia](#) along the [Alps](#). To the south, it consists of the entirety of the [Italian Peninsula](#).

People

Population (January 2011 est.): 60.7 million.

Annual population growth rate (2010): 0.04%, mostly due to immigration.

Religion: Roman Catholic (majority).

Language: Italian (official).

Education: Years compulsory--16. Literacy--98%.

Health: Infant mortality rate--3.7/1,000 live births. Life expectancy--79.1 years for men; 84.3 years for women.

Government

Type: Republic since June 2, 1946.

Constitution: January 1, 1948.

Branches: Executive--president (chief of state), Council of Ministers (cabinet) headed by the president of the council (prime minister). Legislative--bicameral parliament: Judicial--independent constitutional court and lower magistracy.

Subdivisions: 94 provinces, 20 regions..

Suffrage: Vote for House is universal over 18; vote for Senate is universal over 25.

Founding member of the [European Union](#) and part of the [Eurozone](#). Italy is also a member of the [G7](#), [G8](#), [G20](#) and [NATO](#), adheres to the [UN](#). It is also a member state of

the [Organisation for Economic Co-operation and Development](#), the [World Trade Organization](#), the [Council of Europe](#) and the [United Nations](#).

The Italian economy is driven in large part by the manufacture of high-quality consumer goods produced by small and medium-sized enterprises, many of them family owned. Italy is the third-largest economy in the euro-zone, but its exceptionally high public debt and structural impediments to growth have rendered it vulnerable to scrutiny by financial markets. Public debt has increased steadily since 2007, topping 126% of GDP in 2012, and investor concerns about the broader euro-zone crisis at times have caused borrowing costs on sovereign government debt to rise to euro-era records. In 2012 economic growth and labor market conditions deteriorated, with growth at -2.3% and unemployment rising to nearly 11%. Although the government has undertaken several economic reform initiatives, in the longer-term Italy's low fertility rate, productivity, and foreign investment will increasingly strain its economy. Italy's GDP is now 7% below its 2007 pre-crisis level.

2. Some data about food waste in Italy

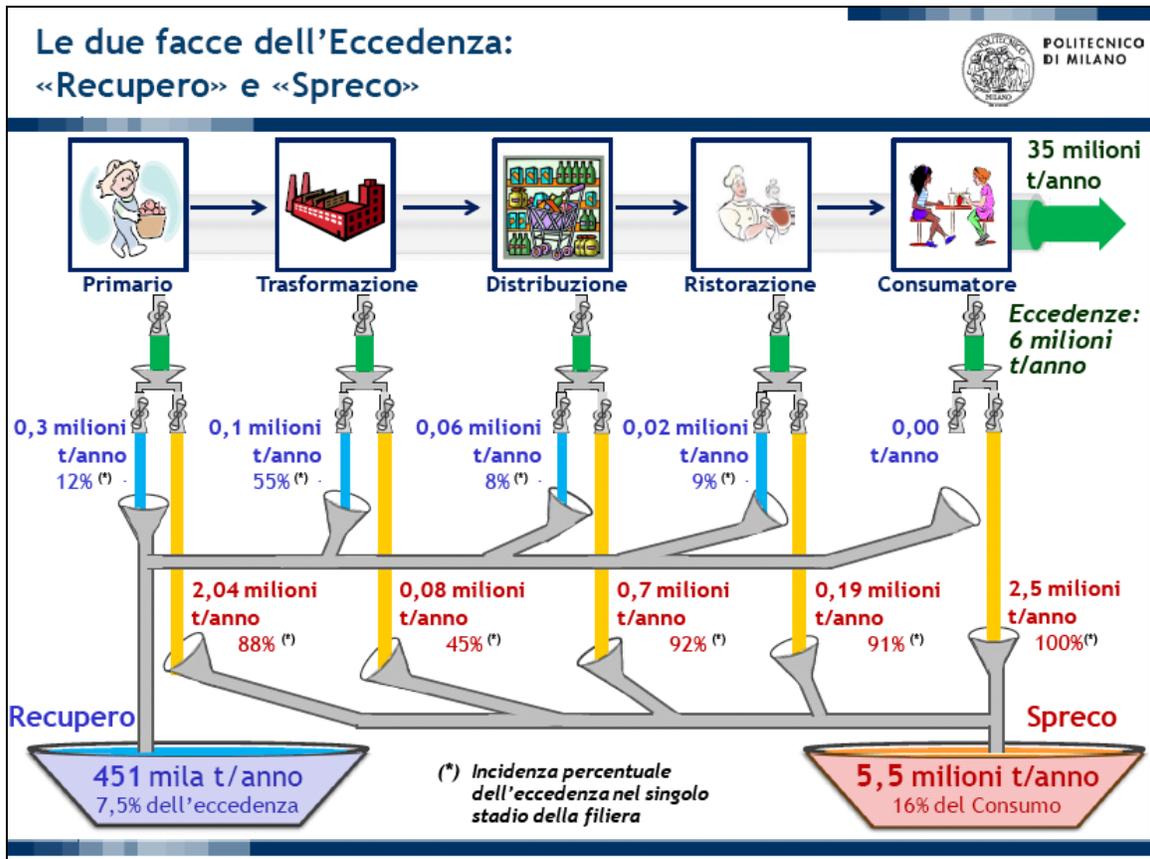
On the basis of the results from the study “Dar da mangiare agli affamati” carried out from the Politecnico of Milan which were presented on January 2015 the overview of the figures about the topic are summarised as follows:

SURPLUS FOOD

- **In Italy are generated annually 6 million tons of surplus**
- **The value of the surplus generated amounts to about 13 billion €**
- **The per capita value of the surplus is 101 kg and 220 €**
- **54% of the surplus generated in the segments is high or medium fungibility**

FOOD WASTE

- In Italy are wasted (from the social point of view) annually 5.5 million tonnes, accounting for 16% of consumption and 92.5% of the surplus, to a value of 12.3 billion €
- Even if the waste is less in the segments that fungibility is greater, 51% of waste is medium-high fungibility
- The 55% of food waste is generated by economic players in the sector, 45% in households



There were other previous initiatives such as the “Waste Watcher”, the new National Observatory on the food waste which was presented in Milan in 2013.

Waste Watcher is a national permanent Observatory on Italian families food waste promoted by Last Minute Market¹.

It aims to provide the community with tools to understand social, behavioral and lifestyle dynamics, generating and causing the households food waste, with the scope to build a knowledge base to support public and private decisions in relation to food waste and fostering the effective waste reduction. For this reason, the Observatory realizes studies and researches, that are provided in public debate occasions or disseminated through periodic publications and ad hoc thematic investigations. Waste Watchers collaborates with SWG² to conduct detections and surveys.

The observatory promoted, together with the European Commission (scientific support of Joint Research Centre), the first questionnaire about domestic food waste in Italy.

The questionnaire was launched in November 2012; it was available for one month on Survey Monkey and 3.000 people responded. Questions were addressing the main causes people discard food and frequency.

The main results are outlined here:

- 60% of Italians throws away food at least once a week;
- 52% declares to waste less food than two years ago;
- 48% throws it in the trash instead of donating (20% of people) or create compost for animal feed (4% of interviewed).

One of the reason why the food is wasted is due to the fact that people cannot retain food in a good way (40% of respondents referred to a wrong conservation of the food).

The food waste imply some environmental, economic and social costs.

FAO calculates that every year 1,3 tons of food are wasted, equivalent to 1/3 of total production destined to human consumption. The economic value of the food wasted in Italy is about 13 billion Euros a year, with an average of 149 kg of food wasted per person³.

Food losses and wastes happen at different levels from the production chain to final consumption. They may occur at production and harvest levels, due to weatherproof,

¹ <http://www.lastminutemarket.it/>

2

² <http://www.swg.it/>

3

³ Source: <http://foodrightnow.it/spreco-di-cibo/>

diseases, infestations, or because of defects in transport and cultivation systems. The food waste could happen also during the products transformation process, which produces food production wastes, or in the wholesale distribution phase, where the food remains unsold because of its discrepancy respect to consumers aesthetic canons.

Finally the restauration and domestic consumption create some food refuses due to excessive portions, the failure consummation of food within the expiration date and some difficulties in understanding label information related to the product consumption.



Figure 2.1 - Food losses and waste in Italy

The food waste phenomenon was neglected in Italy, specialized literature and official statistics on the subject are, in fact, almost non-existent.

Segrè and Falasconi's study in 2011 was the first to provide a quantification of the waste along the whole food supply chain: 20 million tons from the field to the point of sale.

An estimate of the waste was obtained by comparing the amount of food available to every Italian by product type, as reported by FAO (food balance sheets), with the consumption of food per capita per day, as claimed by INRAN (National Research Institute for Food and Nutrition).

The percentage of food surplus is obtained by the difference between how much food is potentially available and what is actually consumed (Figure 2.2.). A significant portion of this figure is definitively classifiable as waste.

Only grains and fish have surplus percentages that do not exceed 50%: in the case of grains, this happens because the products are less perishable, while in the fish sector it is because of the increased technological efficiency of the supply chain.

According to SINU (Italian Nutrition Society), the daily caloric availability for every Italian is about 3,700 kcal, equal to over one and a half times the daily energy requirement, generating a surplus of 1,700 kcal, which can cause overeating or it is wasted.

If we look further into the food supply chain, five stages were identified for Italy:

- Manufacturers;
- Primary cooperatives (specifically, in the fruit and vegetable sector);
- Processing industries;
- Wholesale and retail distributors;
- Consumers.

According to a survey conducted in October 2011 by Coldiretti-SWG, Italians have reduced food waste by 57% because of the economic crisis. To combat waste and thus save more food, as many as three out of four Italians spend more carefully than before. Among the measures taken to reduce food waste are to shop more wisely (47% of respondents), reduce the quantity of food purchased (31%), increase use of leftover products in meals (24%), and pay more attention to expiration dates (18%). According to the survey, Italians are spending more time in grocery stores: 61% compare prices more carefully, 59% watch 3X2 offers, without sacrificing quality. Forty-three percent of respondents indicated that they always check the quality of the products and a similar proportion always checks where the food was produced. During the Christmas season of 2011, the data was not as encouraging.

According to figures supplied by the CIA (Italian Confederation of Farmers), from December 24th to the 31st, Italians threw 440,000 tons of food in the garbage, worth a total of 1.32 billion (20% of total expenditure). These figures are not just negative in terms of environmental impact (consider that a single ton of organic waste generates 4.2 tons of carbon dioxide), but also represent a financial loss that directly affects the family budget, equal to 50 € per household. According to this data, consumers threw away dairy products, eggs, and meat (43%), followed by bread (22%), fruits and vegetables (19%), pasta (4%), and sweets (3%). However, compared to the previous year, there has been a decline of 12% in food waste, but it is still too small when compared with the Coldiretti figure, which estimates the reduction of food waste by 57%.

FOOD CATEGORIES	QUANTITY AVAILABLE g/PERSON/DAY (A)	ESTIMATED CONSUMPTION g/PERSON/DAY (B)	SURPLUS% (A) - (B)
 Grains, grain products and substitutes	433	258	40%
 Vegetables, fresh and processed	463	211	54%
 Fruit, fresh and processed	418	208	50%
 Alcoholic beverages and substitutes	205	91	55%
 Meat, meat products and substitutes	242	110	54%
 Fish and fish products	67	44	33%

Figure 2.2 – Quantity of food waste in Italy (2005-2006); Source: Segrè and Falasconi, 2011

	TOTAL PRODUCTION (000 t)	HARVESTED PRODUCTION (000 t)	REMNANTS IN THE FIELD (000 t)	%
 Fruit	62,178	61,069	1,108	1.78%
 Citrus Fruits	37,849	37,095	753	1.99%
 Olives*	34,541	32,866	1,675	4.85%
 Grapes**	83,131	80,378	2,752	3.31%
 Open field vegetables***	127,936	124,416	3,519	2.75%
 Greenhouse vegetables	15,712	13,744	1,968	12.53%
 Legumes and potatoes	20,009	18,966	1,043	5.21%
Total fruit	217,699	211,408	6,288	2.89%
Total vegetables	163,657	157,126	6,530	3.99%
Total fruits and vegetables	381,356	368,534	12,818	3.36%
Total grains	163,795	158,915	4,879	2.98%
Total	545,151	527,449	17,697	3.25%

Figure 2.3 – Tons of agricultural production remaining in the fields (2009)

Source: Segrè and Falasconi, 2011

2.1 Waste in agriculture

Food losses in agriculture amount to 10 billion euros.

30% of fruits and vegetables is rejected because they do not match with consumers market tastes and aesthetic canons, despite they are perfectly edible.

Based on data collected by ISTAT (National Statistics Institute), it was possible to quantify the percentage of agricultural production that remained in the fields, amounting to 3.25% of the total (17,700,586 tons).

According to a time series analysis from 2006 to 2009, 2009 was the year with the most produce wasted in the field because of very low market prices for grain (especially corn).

In the fruit and vegetable sector, waste is also affected by primary cooperatives, which must implement the Common Market Organization (CMO) rules. These rules may include the withdrawal of part of the production to avoid the collapse of prices.

The recalled product is, in fact, intended only in part for free distribution (for vulnerable populations, schools, and prisons), while most of it is used for distilling alcohol (36%), composting (55%), and animal feed (4%). These uses are considered waste because the product is used differently than the human consumption for which it was originally cultivated.

During 2005-2006, only 4.43% of the recalled product was not wasted (a total of nearly 73,000 tons).

Reasons of waste in agriculture
• Production excess
• Weather event: hail, drought, floods, intense cold, etc.
• Too much or too mature unripe
• Battered Products
• Do not conform to aesthetic
• Outside size to 30% of fruit and vegetables
• Failure irrigation
• Inefficiency in harvest phase
• Pests, diseases, contamination
• Maintenance of the prices with the elimination of the product
• Collection costs higher than the market price
• Mechanization not able to separate the ripe from unripe products
Possible solutions
• To develop sector agreements between growers, manufacturers and retail chains

• To leave the field collection for non-profit entities or indigent reported subjects
• Donations to charities and non-profit organization of unsold food
• To reduce the productions
• Composting and animal feed
• Destination for food industry and distillation
• To produce food with waste and unsold food
• Clearance of surplus and unsold food
• Increase in community gardens
• To create people's supermarket / fast food in solidarity
• Advertising and food information and their quality

Source : Milan Protocol report on food waste; 2013.

2.2 Waste in fishing

In Italy they fish 475.000 tons a year, including aquaculture, with a discard of 10.500 tons. Compared to other sectors, the fish industry is characterized by a minor waste because there is a higher technological efficiency in the production chain.

Reasons of waste in fishing
• Over-fished
• Unsold food
• Improper storage
• Interruptions in cold chain
• Diseases, pests, contamination in fish
• Out-sized product quantity
• Types of fish not appreciated by market
• Waste in processing and inefficiency in the processing chain
• Battering products
• Products close to maturity
• Maintenance of the prices
Possible solutions
• To develop sector agreements between growers, manufacturers and retail chains
• Donations to charities and non-profit organization of unsold food
• To reduce fishing and respect the days of stops
• Clearance of surplus and unsold food
• To produce food with waste and unsold food
• Ethics Passport for fish products
• Composting and animal feed
• Destination for food industry
• To create people's supermarket / fast food in solidarity
• Waste collection

Source : Milan Protocol report on food waste; 2013.

2.3 Waste in food industry

The F&D Industry is the largest manufacturing sector in Europe with an annual turnover of €1,017 trillion, half of which is generated by SMEs (49,3%). The sector is a leading employer in the EU manufacturing sector (15.0%) employing about 4.3 million people and is highly fragmented comprising some 287,000 companies. Even if the European agro-food industry is a leading global exporter and affords significant value addition, its competitiveness is at risk and the European Commission has consistently urged the food sector to become more competitive by increasing its spending on R&D as a means of introducing new products and processing techniques to the market. The food and drink industry, traditionally a sector with low R&D investments (of which often more than 80% is development and less than 20% is research), must change its course after a long period of incremental innovation ('mixing and stirring'). FEDERALIMENTARE and its 17 adhering branch Associations plus 3 associated branch Associations represent the FOOD&DRINK INDUSTRY, one of the pillars of the national economy. Along with agriculture, induced activity and distribution, the FOOD&DRINK INDUSTRY is the CENTRAL ELEMENT of the 1st ECONOMIC CHAIN of the COUNTRY:

- It is the 2nd MANUFACTURING SECTOR IN OUR COUNTRY, after the engineering industry and it is the 3rd FOOD&DRINK INDUSTRY IN EUROPE, behind Germany and France.
- It purchases and processes 72% of the NATIONAL AGRICULTURAL RAW MATERIALS.
- It is generally recognized as the AMBASSADOR OF MADE IN ITALY IN THE WORLD considering that almost 80% of the Italian agro-food export is represented by high quality industry brands and PDOs / PGIs.
- It is characterized by a SIGNIFICANT PREVALENCE of SMES: about 6.250 companies of which 30 are large, about 220 are medium in size and the remaining 6.000 are small, but very small size (up to 10 employees).

Sustainable development is a form of economic development that does not compromise the possibility of future generations to go on, preserving the quality and quantity of natural heritage under a regime of social equity and environmental balance. The Italian food and drink Industry has a strong interest in the affirmation of global scale models of sustainable production and consumption, able to meet the growing demand of the world population and to ensure the competitiveness of agrifood systems while respecting the environment and local communities. The food and drink Industry - in collaboration with the primary production - is engaged in a series of concrete actions and initiatives aimed at promoting environmental sustainability in agriculture. The aim is to ensure supply of raw materials, in sufficient quality and quantity, respecting the environment and enhancing the competitiveness of agricultural systems.

Actually there are 4 strategic areas of intervention:

- **Sustainable supply and exploitation of agricultural raw materials;**
- Efficient use of basic resources (energy and water);
- Optimization of packaging and proper management of after - use packaging;
- **Promote sustainable consumption and reduction of food wastage along the food chain**

In the Italian food industry are generated 6 million t / year of **surplus food** (17.4% of the annual consumption of food) while are **wasted** 5.5 million t / year (16% of the annual consumption of food)

Reasons of waste in food industry
• Achieving sell-by date Inside
• Non-compliance of the product (eg. Aesthetic defects, not quality)
• Nonconformity packaging
• Interruptions in cold chain
• Returns (contextual in delivery or unsold)
• Products with altered flavour
• Incorrect demand forecasting
• Waste in processing and inefficiency in the processing chain
• Battering products
• Surplus production
• Products close to maturity

• Over-sized products
• Processing Waste and scraps
• Climate conditions
• Defects in packaging, packaging contamination
• Damages in goods movement
• Sampling residues
• New products tests
• Seasonality
• Products close to maturity
• Stock management
• Errors in label understanding
Possible solutions
• To develop sector agreements between growers, manufacturers and retail chains
• Donations to charities and non-profit organization of unsold food
• To reduce production
• To reduce packaging
• Clear and detailed labeling
• Clearance of surplus and unsold food
• Composting and animal feed
• Ethics Passport for food products
• To create people's supermarket / fast food in solidarity
• Waste collection
• Legislation requiring the redistribution / reuse of food falling due
• Excise duties on injurious to health food

Source : Milan Protocol report on food waste; 2013.

2.3.1 The prevention in the food industry: a best practice from the EU approach

Federalimentare, representing Food & Drink companies, participated in the FoodDrinkEurope task force working group “Prevention of the wastes along the supply chain – Intervention area, actions and operative proposal of the FOOD WASTAGE TOOLKIT OF FOODDRINKEUROPE.

Introduction

FoodDrinkEurope in 2013 released a common declaration to prevent Food Wastage, “Every crumb counts” and a Food Wastage Toolkit on-line. The Declaration is a programming document based on FAO definition of “food waste” caused by:

- losses during and post primary production and food processing;

- wastage during retails and consumption

The toolkit promoted by FoodDrinkEurope looks like a web platform that aims to provide guidance to manufacturers of foods and beverages to prevent food waste as part of the phases of their expertise, but also showing them how you can help the other partners of the food chain to pursue the same goal, as well as providing functional recommendations for policy against waste. The prevention of food waste requires an integrated approach to supply chain and can be implemented in different lines of action:

- make operators aware of the entire chain of food waste
- contributing to the development and dissemination of best practices (eg the toolkit)
- avoid food losses during the transformation process

Avoid food losses during the transformation process

- Measure food losses and identify their causes
- Train staff in the prevention of food losses (corporate training initiatives, also public, such as the Food Recovery Waste Reduction Project funded by the EU, which is developing a training plan online free for representatives of the food chain).
- Optimize production.
- Identify the key issues and find solutions to reduce food losses and optimizing the drafting.
- Set up systems to enable the rapid withdrawal or rework products.
- Identify solutions to address the interruption of production (in particular by taking steps to rationalize the best solutions in relation to the different segments of the production line).
- Working to better determination of sales forecasts and then planning the production, using the historical data and forecasts considering all the factors that can affect production levels in line with the requirements and needs of market placement.
- Optimize logistics, cooperating with other producers and customers.
- Identify partners with flows of surplus that can be reused or with whom "join" waste streams in order to make recycling economically viable.

How the food processors can help farmers to reduce food losses

- Transform perishable raw materials into products, "stable", while preserving flavor, aroma, freshness, texture, appearance, and preventing deterioration (just think of the instant coffee ...).
- Place processing plants near the places of primary production, where possible and appropriate also from an environmental perspective, to reduce the time of transport and encourage the transformation of fresh products (eg sugar, canned vegetables, wine, milk and meat , etc ...).
- Working with partners in the supply chain to facilitate storage, cold chain and transport, in order to protect quality and safety for longer.
- Working with suppliers through training and development of innovation to ensure that the raw materials comply with the requirements of security and trade.

How food manufacturers can help consumers reduce food waste

- Extend the shelf life through innovation of packaging and packaging.
- Provide information in clear and easily legible labeling on the durability and the storage and preparation, including portioning.
- Provide for appropriate portions to different needs / lifestyles

Redirecting surplus food production

- Identify alternative channels such as food banks or other markets for products still safe from the point of view of sanitation but unfit - for commercial reasons - to distribution through regular channels (approximately 1/5 of the food given to the so-called food banks comes by the industry transformation, details about national food banks can be found on the European Federation of Food Banks' website)
- Create new products from foods that might normally be thrown away. If food losses can not be avoided reworking the product in the same production line, should be considered other possible uses food (mashed, smoothies, soups etc ...)

- Recall, in accordance with the health standards required by food law, the plant residues for the production of food and pharmaceuticals / cosmetics (theme also present in the Strategic Research and Innovation Agenda of the European Technology Platform Food for Life, which highlights opportunities of enhancement of biomolecules to produce functional foods, natural preservatives etc ...)

Redirect surpluses in feed and industrial uses

- Use surpluses and by-products for the production of feed is the second best alternative when the use of such materials for the production of foods is not feasible. This outlet is widely used for the by-products unfit for human consumption.

- Identify functional markets to other productive sectors different from food / feed industries, in which surplus food and food-products can be effectively used as input (cosmetics, biomaterials etc ...)

Recovery

Soil enrichment

- Turn food losses and by-products into fertilizers (eg digestate from anaerobic digestion, sludge from waste water treatment)

Production of renewable energy

- The production of energy can be recovered in several ways (combustion, anaerobic digestion)

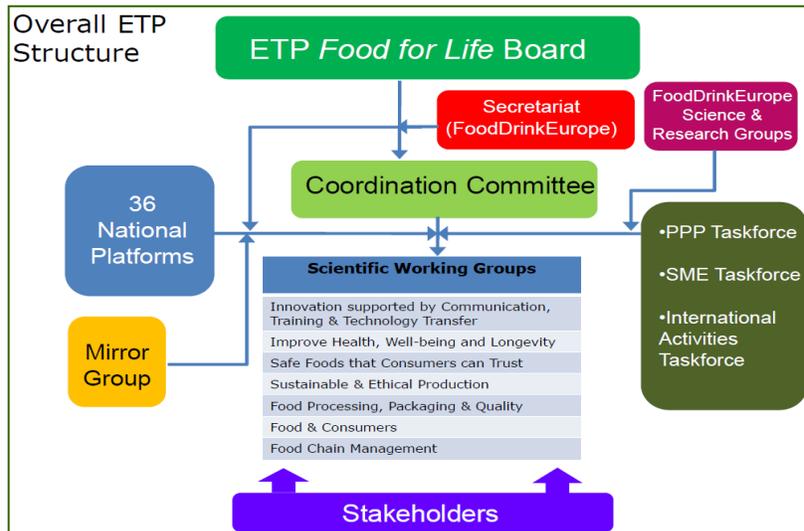
2.3.2 EU Platform FOOD FOR LIFE: National Platform Italian Food For Life

Technology Platform are industry-led initiatives to aggregate stakeholder from RTD, Innovation and food industry to deal with Strategic Research and Innovation Agenda.

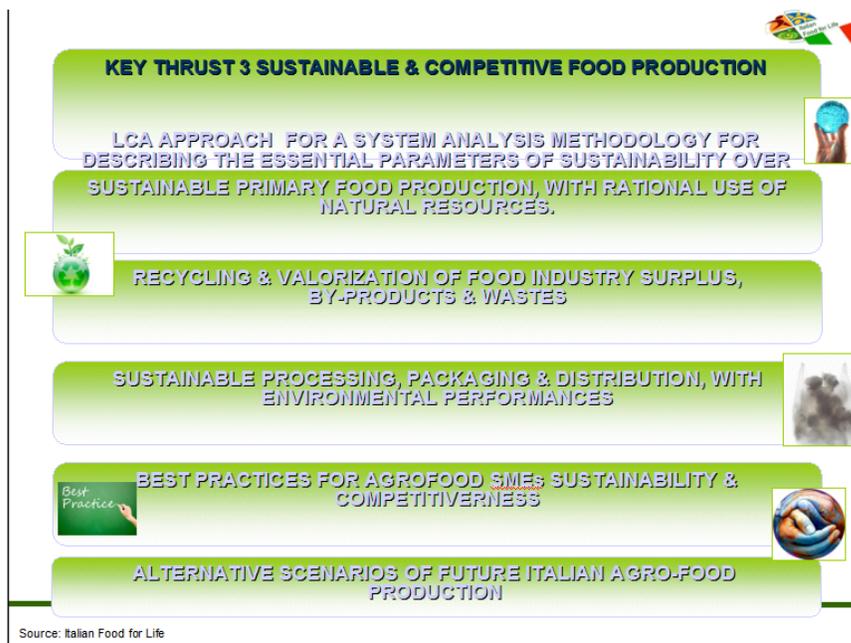
Main objective of Italian Technology Platform are:

- Increase R&D strategy;
- Coordinate research in Europe and prevent duplication;
- Promote SME participation, specific programmes and networks;

- Focus, align and collaborate transnationally between stakeholders;
- Increase multidisciplinary / cross-sector education and;
- Optimise knowledge capture and dissemination of knowledge between Member States and towards SMEs.



Under the Key Thrust 3 Sustainable & Competitive food production the specific objective are:



Following the above mentioned structure one of the priority is the **Goal 1: Reduction of waste**: Utilization of waste from food products; Reduction of Waste from Packaging; Reduction of Waste in Energy; Reduction of Waste in Water

2.3.3 The Italian Cluster Agrifood

Under this national programme cofinanced by the Ministry of Education **the project n. 4 of Cluster Agrifood CL.A.N. – Italian food chain sustainability** aims at:

- Adaptation to climate changes and primary production sustainability by genetic improvement, precision farming and energy efficiency certification
- **Use of food and drink Industry by-products and residues**
- Food management and conservation to reduce wastage

2.4 Waste in organized distribution

Retailers counts 19,500 supermarkets in Italy (covering 70% of the market) 175,000 traditional markets and 29,000 street vendors. The gap in this market segment, only in Italy is 238,000 tons per year, with a loss of 900 million euro.

In Italy 288,000 tons of bread are thrown every year. In a supermarket you can find bread and derivatives: 39 types of bagged and loose bread, 23 types of white bread, sandwiches and toast bread, 13 types of tortillas, 45 types of breadsticks, 15 different types of bruschetta and 23 of cracker.

But it's the cheese that beats the record with a presence, including packaged and bench of 238 kinds. If we multiply each product for 30/50/100, that represent the pieces that on average the distribution buys (and who renews) we have a really impressive result to which we must add all the other food that can be found in the store (in a hypermarket there are about 50,000 food products). These data confirm that the mass distribution provides 80% food more than the population needs.

The overabundance of food makes consumers less sensitive to the meaning of food and its consumption.

In domestic spending, the 20% of purchases are not planned. The attractive promotional offers "three for two" or "below cost" are often responsible for failure to inventory control at the household level.

Reasons of waste in organized distribution
• Loss of hygiene
• Unsold food
• Improper storage
• Interruptions in cold chain
• Maintenance of price levels
• Products with altered flavour
• Incorrect demand forecasting
• Battering products
• Surplus production
• Products close to maturity
• Over-sized products
• Processing Waste and scraps
• Climate conditions
• Defects in packaging, packaging contamination
• Returns (in the organized distribution they are about the 28%)
• Company failure
• Damages in goods movement
• Free gifts, discounts and exceeded points, residues of advertising campaigns
• Over season food (panettones, easter eggs, ice creams)
• Seasonality
• Image changes
• Products close to maturity
• Stock management
• Errors in label understanding
• Handling of the product by the customer
Possible solutions
• To develop sector agreements between growers, manufacturers and retail chains
• Donations to charities and non-profit organization of unsold food
• To monitor stocks
• To reduce stocks and quantities on the shelves
• To reduce packaging
• To create people's supermarket / fast food in solidarity
• Composting and animal feed
• Vacuum packaging of bread and other fresh produce
• To change freshness parameter of eggs with a label
• To delete the faulty product along with other healthy in the same package
• Clear and detailed labeling
• Clearance of surplus and unsold food
• To print recipes and tips on recovering food on bags of bread and other food
• Sustainable purchases
• Packaging for single-dose
• Waste collection
• Legislation requiring the redistribution / reuse of food falling due

- Excise duties on injurious to health food

Source : Milan Protocol report on food waste; 2013.

2.5 Waste in catering, commercial and domestic restoration

In Italy there are 230,000 eateries so divided:

3000 for catering (canteens, schools, hospitals, military, prisons) with a waste of 87,000 tons per year;

227,000 commercial catering (bars, pizzerias, restaurants, fast food, etc.) with a waste of 122,000 tons, for a total of 190,000 tons per year;

Domestic waste is 100 kg per year per capita.

The average path of a meal is about 190 km.

Spending, in Italy, accounted to 30% in 1970 and 12% today.

In Italian schools 380 million meals are consumed in a year, amounting to 1.3 billion euros, of which 10% (equal to nearly 87,000 tons of food) are surplus and the 85% of that is thrown between waste. It is important not to convey to students the message that the waste is right; observing every day how much food is thrown in the trash, they are induced to use it as a reference model.

Reducing food waste in school cafeterias, we could allocate the money saved to other investments to improve schools facilities and services for students.

Reasons of waste in catering, commercial and domestic restoration
• Production surplus
• Wrong purchases
• Inadequate storage
• Wrong storage
• Interruptions in cold chain
• Climate conditions
• Inappropriate ordering
• Battering products
• Surplus production
• Products close to maturity
• Over-sized products
• Processing Waste and scraps
• Climate conditions
• Excessive portions, food surplus

• Unsold food
• Products are damaged or expired
• Wilting
• Loss of hygiene
• Altered taste
• Kitchen waste
• Leftover food
• Errors in label understanding
• Left and unfinished wines, water and soft drinks
Possible solutions
• To develop agreements between restaurateurs, public events and stakeholders
• Donations to charities and non-profit organization of unsold
• Fast food in solidarity
• Destination for animal feed
• To monitor stocks both in cells in the fridge
• To reduce portions and purchases
• Vacuum packaging of meals
• Doggy bag and wine bag to bring home the uneaten
• Clearance of unsold
• Print recipes and tips on placemats or recovery on food packaging
• Clear and detailed Lettering food
• Clearance of the unsold food before closing
• Separate collection, composting
• Sustainable Purchasing
• Progressive dishing in school canteens
• Legislation requiring the redistribution / reuse of food falling due
• Excise duties on injurious to health food
• Dissemination of training programs in schools to raise awareness
• Food sharing

Source : Milan Protocol report on food waste; 2013.

3. Waste in the meat, milk and canning sector

Introduction

There are no clear and official data about food losses along the food processing lines for meat, milk and canning and no previous studies could be taken as official reference. However starting from the statistics on annual production (ISTAT and Federalimentare elaboration) and taking advantage from several research publication (especially ENEA

and CRPA Institutes) it is possible to estimate the waste potential as follows for the three different product categories.

CANNING sector

- ***fresh fruit***

The kernels constitute that part of the waste resulting from the production of fruit juices, jams and fruit syrup, which can be recovered for the production of energy. The most significant among these quantities are those arising from the process of peaches, nectarines and apricots. In the absence of official data the estimates are the result of a series of assessments made on the basis of data and information obtained from the most reliable industry associations, which shows that the percentage of fruit for the food processing sector in the total product and about the 25% for peaches and nectarines, and apricots for 15%. The percentage by weight of the whole fruit kernels and for almost all about 8%, and the percentage by weight of dry substance on such and approximately 90%. A good proportion of this waste is already used as a source of energy (process heat), especially in larger companies.

- ***Dried Fruit***

The shells are that part of the waste resulting from the processing of dried fruits, which can be recovered for the production of energy. In the absence of official data the estimates are the result of a series of assessments made on the basis of data and information obtained from the most reliable associations. The amount of hazelnuts for processing annually and about 110,000 t; of these edible part and around 42% for an annual production of about 64,000 t of waste. The amount of almonds is around 100,000 t; of these edible part and on average about 25% for a production of waste around 75,000 t. The amount of walnuts for processing annually and about 31,500 t; of these the edible portion and an average of about 50% for a production of waste close to 16,000 tonnes. For the shells of hazelnuts, almonds and walnuts, the percentage by weight of dry matter on such and roughly 90%.

- ***Tomatoes***

Among the waste from the industrial processing of tomatoes, as well as process water, partially re-used within the production cycle, originates significant quantities of waste that if properly treated may be of use energy. Such residues are due basically to two types, seeds and skins. The industrial processing of tomato is often concentrated in particular areas of our country, such as the industrial district of Nocera Inferiore in Campania, where in addition to local production of tomatoes, we also work large quantities from other regions. In the absence of official data, at the national level to assess the quantity of waste arising from industrial processing of tomatoes, and it appeals to an estimate made of such residues based on deductive.

Knowing that, in principle, 70% of the annual production of tomatoes and to the industry, which leads to a lot of waste of about 4%, and is able to estimate the amount of residual biomass

potentially available? In Italy, in the last 5 years (ISTAT 2006-2010), were produced on average about 5.6 million tonnes of tomatoes a year; of these about 3.8 million tonnes were destined for the processing industry with a production of waste estimated at just over 150,000 t / year. Assuming a value for these differences humidity of 10% and arrived at an estimate of the potential annual 140,000 tonnes of dry matter.

In relation to the processing industry the only tomato, in addition to the hulls, They produce more waste flows, consisting of green berries and / or gears by optical sorting and scraps of trash handling effluent of water entering the plant purification company. these affecting in a variable manner as a function the quality of the raw material and can represent from 1.2 to 5% by weight initial

MEAT sector

The Meat Industry is characterized by a significant production of animal by-products (ABP) that governed by Regulation (EC) 1069/2009 and Regulation (EU) 142/2011 and do not fall in waste legislation. The SOA are awarded to companies rendering authorized to carry out this activity which also has a health and social issues as the sector helps to avoid the proliferation of epidemics and animal diseases resulting in serious health risks.

The chain produced from the SOA (with approximately 2,052,000 tons per year) about 20% in melted fat, 27% of flour. The areas of use of animal by-products are manifold: the production of bio-energy from bioliquids, being renewable sources, for the production of thermal energy for process heat and for the production of electrical energy. Since 2012 bioliquids will be certified sustainable under Directive 2009/28 / EC transposed by Legislative Decree no. 28/2011. A portion of the melted fat is destined to the industry of biodiesel. Besides the production of energy include the production of feed for fur animals or pets. More destinations are represented by the industry cosmetics, the pharmaceutical and dall'oleochimica.

To promote the energy use of SOA, the industry is considering entering into a framework contract for the supply chain. Today in Italy you can use SOA for generating energy, including cogeneration, and contribute to meeting the Italian and EU to reduce CO2 emissions and energy production from renewable sources.

PIGS

In pigs, compared with a yield slaughter 80%, animal not intended for human consumption (about 18%) account for almost all those produced in the complex. a flow which can actually be recovered is that consisting of the guts (about 10 kg / head), to be allocated to casings (budellerie) for the production of sausages.

Slaughter of pigs (weight in kilograms) - Regional data - Anno 2012-

Regioni	Unit	Live weight		Average yield (%)	Dead weight
		Total	Average unit		
Piemonte	713614	1125831	1,58	82,3	926180
Valle d'Aosta/Vallée d'Aoste	220	367	1,67	79,8	293
Lombardia	5361431	8500115	1,59	80,3	6822467
Liguria	743	907	1,22	79,1	717
Trentino-Alto Adige	60749	86246	1,42	79,1	68242
Bolzano/Bozen	9074	10774	1,19	79,3	8540
Trento	51675	75472	1,46	79,1	59702
Veneto	396007	585006	1,48	79,8	466860
Friuli-Venezia Giulia	142222	211207	1,49	76,7	161986
Emilia-Romagna	3960265	6546712	1,65	79,6	5210241
Toscana	290367	440603	1,52	79,0	347859
Umbria	454957	707429	1,55	80,1	566573
Marche	140726	204753	1,45	80,5	164770
Lazio	391305	609215	1,56	79,8	486441
Abruzzo	440786	605319	1,37	78,9	477751
Molise	40523	52441	1,29	77,6	40680
Campania	331449	431473	1,30	78,3	338023
Puglia	151640	213368	1,41	79,3	169282
Basilicata	35591	43373	1,22	78,4	34008
Calabria	98745	121530	1,23	78,5	95434
Sicilia	158413	174465	1,10	78,6	137155
Sardegna	594601	273723	0,46	78,5	214787
ITALIA	13764354	20934083	1,52	79,9	16729749

Slaughter of equins (weight in quintals). Regional details - Anno 2012

Regions	Unit	Live weight		Average yield	Dead weight
		Total	Average unit		
Piemonte	4096	20144	4,92	53,6	10801
Valle d'Aosta/Vallée d'Aoste	2	6	3,00	33,3	2
Lombardia	3497	17342	4,96	56,9	9859
Liguria	501	2485	4,96	55,0	1367
Trentino-Alto Adige	359	1311	3,65	55,3	725
Bolzano/Bozen	234	791	3,38	55,8	441
Trento	125	520	4,16	54,6	284
Veneto	12382	63749	5,15	59,5	37922
Friuli-Venezia Giulia	616	3012	4,89	57,3	1726
Emilia-Romagna	5935	34515	5,82	57,9	19978
Toscana	225	939	4,17	56,8	533
Umbria	157	626	3,99	59,3	371
Marche	225	990	4,40	59,0	584
Lazio	2589	12625	4,88	55,7	7027
Abruzzo	361	1476	4,09	55,1	813
Molise	30	126	4,20	55,6	70
Campania	679	3018	4,44	55,2	1665
Puglia	31144	136731	4,39	53,5	73099
Basilicata	627	2050	3,27	59,5	1219
Calabria	211	966	4,58	53,6	518
Sicilia	1797	7836	4,36	53,5	4190
Sardegna	1572	10293	6,55	61,8	6358
ITALIA	67005	320240	4,78	55,8	178827

MILK sector

In the dairy industry Regional the product par excellence is the whey, being predominant share of milk for processing for the production of Parmesan cheese (Grana Padano and Parmigiano-Reggiano). The feeding to livestock (pigs) is still the solution prevalent; about this form of recovery found that newly Services veterinarians are asking the full traceability of batches of serum delivered to the farms, so completely analogous to the remaining food livestock. This request is a result the entry into force of Regulation Ce n. 79/05 containing lines guide for the use of milk, milk-milk and milk byproducts for animal feed (material Category 3 low-risk and hygiene health).

Slaughter of cattle and buffaloes (weight in quintals). Regional details - Anno 2014					
Regions	Unit	Live weight		Average yield	Dead weight
		Total	Average unit		
Piemonte	78884	190531	2,42	59,9	114203
Valle d'Aosta/Vallée d'Aoste	2085	5340	2,56	59,9	3198
Lombardia	89561	229680	2,56	56,6	129897
Liguria	4208	12167	2,89	64,2	7816
Trentino-Alto Adige	6467	12762	1,97	60,2	7680
Bolzano/Bozen	2493	4730	1,90	60,3	2852
Trento	3974	8032	2,02	60,1	4828
Veneto	168007	439448	2,62	57,4	252351
Friuli-Venezia Giulia	601	1302	2,17	58,0	755
Emilia-Romagna	307664	726112	2,36	57,6	418168
Toscana	5810	14208	2,45	63,6	9035
Umbria	9910	25618	2,59	61,0	15635
Marche	5750	17848	3,10	63,5	11325
Lazio	6182	14688	2,38	59,1	8676
Abruzzo	4668	8024	1,72	60,4	4849
Molise	376	842	2,24	62,1	523
Campania	5180	10564	2,04	59,3	6263

Puglia	15929	36638	2,30	60,7	22257
Basilicata	2729	7309	2,68	60,7	4436
Calabria	5231	12811	2,45	60,2	7706
Sicilia	21655	50546	2,33	59,3	29982
Sardegna	3461	8544	2,47	62,6	5352
ITALIA	744358	1824983	2,45	58,1	1060107

* * * * *

Slaughter of sheep and goats (weight in quintals). Regional details - Anno 2014					
Regions	Unit	Live weight		Average yield	Dead weight
		Total	Average unit		
Piemonte	45649	7534	0,17	53,7	4045
Valle d'Aosta/Vallée d'Aoste	1650	378	0,23	52,9	200
Lombardia	39464	9993	0,25	52,7	5265
Liguria	4112	610	0,15	54,3	331
Trentino-Alto Adige	24716	4474	0,18	53,6	2400
Bolzano/Bozen	21430	3946	0,18	53,2	2100
Trento	3286	528	0,16	56,8	300
Veneto	15277	2688	0,18	56,8	1526
Friuli-Venezia Giulia	4450	791	0,18	68,5	542
Emilia-Romagna	11559	2948	0,26	55,8	1645
Toscana	348013	56251	0,16	56,7	31888
Umbria	129575	24320	0,19	56,8	13821
Marche	146313	23747	0,16	57,0	13545
Lazio	1477977	259775	0,18	53,2	138176
Abruzzo	524284	114835	0,22	56,1	64432

Molise	122799	21626	0,18	56,7	12258
Campania	374043	58031	0,16	55,9	32448
Puglia	790065	130379	0,17	56,0	72948
Basilicata	294864	44307	0,15	57,7	25560
Calabria	152368	21796	0,14	54,1	11795
Sicilia	244132	45836	0,19	54,3	24907
Sardegna	1236609	152405	0,12	56,2	85707
ITALIA	5987919	982724	0,16	55,3	543439

Raw materials collected and products obtained by the dairy industry, by type of production unit (quantity in kilograms) - Year 2013

Raw materials collected and products obtained by the dairy industry	Dairy milk plants	Plants for farms	Farmers cooperatives	Collection centres	Total
Raw material collected					
Cow milk	44184643	933768	36137791	22718451	103974653
Sheep milk	2620069	92458	1012012	113829	3838368
Goat milk	225075	5084	44593	143	274895
Buffalo milk	1469518	45625	370424	63361	1948928
Dairy obtained: fresh produce					
Drinking milk	23562243	150	2068178	-	25630571
Whole milk	10253707	150	887324	-	11141181
whole pasteurized	7316370	150	658107	-	7974627
whole sterilized	274710	-	-	-	274710
whole UHT (ultra high temperature)	2662627	-	229217	-	2891844
low-fat milk	12285411	-	1129447	-	13414858
partially skimmed pasteurized	4433494	-	290094	-	4723588
partially skimmed sterilized	1039279	-	-	-	1039279
partially skimmed UHT (ultra high temperature)	6812638	-	839353	-	7651991

skimmed milk	1023125	-	51407	-	1074532
Buttermilk	276401	-	195493	-	471894
Cream or cream consumption	1022321	2230	157708	-	1182259
with fat content by weight of less than or equal to 29%	544648	2230	91517	-	638395
with content by weight of fat greater than 29%	477673	-	66191	-	543864
Fermented milk (yogurt and others)	2866022	500	312507	-	3179029
with additives	2428473	200	216794	-	2645467
without additives	437549	300	95713	-	533562
Based beverage preparations of milk	48045	-	-	-	48045
Other fresh (gelled milk, desserts, etc.).	67063	300	306	-	67669
Dairy obtained processed product					
Concentrated milk	*	-	-	-	*
not sweetened	*	-	-	-	*
sweetened	*	-	-	-	*
Powdered milk products	*	-	-	*	*
Cream powder	-	-	-	-	-
Whole milk powder	*	-	-	-	*
Semi-skimmed milk powder	-	-	-	-	-

skimmed milk powder	*	-	-	-	*
Buttermilk powder	-	-	-	-	-
Other powdered products	-	-	-	*	*
Butter	648048	12305	275277	47954	983584
normal	475774	11852	256286	47954	791866
other (including buttermilk)	172274	453	18991	-	191718
Cheeses	8723226	117431	2734276	2470	11577403
Hard cheeses	2033128	75264	1998513	270	4107175
-parmigiano reggiano	310969	54566	734959	270	1100764
-grana padano	852375	1140	904011	-	1757526
other grana	212718	-	15290	-	228008
pecorino (all types)	197565	13930	105135	-	316630
other hard cheeses (montasio, asiago)	459501	5628	239118	-	704247
Semi-hard cheeses	726873	9445	238691	2200	977209
provolone	300824	828	74090	-	375742
-caciocavallo	82445	696	4340	2200	89681
-fontina	10608	380	16679	-	27667
other semi hard cheeses (emmental, fontina, ecc.)	332996	7541	143582	-	484119

Soft cheeses	1523918	2138	126331	-	1652387
-italico	41350	-	1402	-	42752
-taleggio	56240	-	8089	-	64329
gorgonzola	577695	-	34203	-	611898
crescenza and stracchino	461035	-	5370	-	466405
other soft cheeses (caciotte all types)	387598	2138	77267	-	467003
Fresh (spun paste, paste not spun, cream-based)	4439307	30584	370741	-	4840632
mozzarella from bufala campana	162902	1933	47430	-	212265
mozzarella bufala	173425	6787	27296	-	207508
other fresch cheeses (robiola, mascarpone, scamorza)	4102980	21864	296015	-	4420859
Processed cheeses	390020	27	40	-	390087
Whey					
Used for the production of ricotta	7449528	19195	489293	-	7958016
Used in liquid form for the feeding of livestock	14085915	377083	7116688	-	21579686
Used in concentrated form	9588604	-	1575745	-	11164349
Powder and pieces	-	-	7213537	-	7213537
Lactose	*	-	-	-	*
Lactoalbumine	-	-	-	-	-

Reasons of waste in meat, milk and dairy products
• Loss of hygiene
• Battered Products
• Waste and scrap processing
• Interruptions in cold chain
• Climatic conditions, excessive heat
• Incorrect demand forecasting
• Diseases of livestock and animal mortality
• Unsold livestock
• Overproduction, surplus production
• Improperly storing
• Maintenance of the prices
Possible solutions
• To develop sector agreements between growers, manufacturers and retail chains
• Donations to charities and non-profit organization of unsold food
• Clearance of surplus and unsold food
• To produce food with waste and unsold food
• To reduce production
• Composting and animal feed
• Destination for food industry
• To create people's supermarket / fast food in solidarity
• Waste collection

Source : Milan Protocol report on food waste; 2013.

4. Other best practice samples

4.1. Last Minute Market

<http://www.lastminutemarket.it/impresa/introduzione>

Last Minute Market is a spin-off of the University of Bologna (Prof. Andrea Segré), founded in 1998 as a research activity. In 2003 it became a business reality and started operating throughout the national territory by developing local projects aimed at recovering unsold goods (or non-marketable) in favour of charitable organizations. LMM contributes to reducing waste in all its forms through the enhancement of unsold goods. After several years of studies and research university, LMM has developed in 2000 the first professional system in Italy for the reuse of unsold goods from the mass distribution.

This is the strongest and more active reality in Italy for what food waste concerns and the biggest part of features and data collection comes from its activity research.

It has promoted the following initiatives

- *Un anno contro lo spreco* (A year against waste)
<http://www.unannocontrolospreco.org/it/>

It's an raising awareness campaign against waste food launched in 2010. A goal stated from the outset, from the country of Last Minute Market through the Joint Declaration which aims to halve food waste by 2025, signed by thousands of citizens, public officials, Members of Parliament, eminent personalities from the Italian cultural and scientific thought, as well as the world of information.

- *Carta SprecoZero*

With the SprecoZero Declaration, signatories commit themselves to activate the Decalogue of good practices against food waste that immediately makes operating the indications of the European Parliament resolution against waste. The paper has already been signed by 231 municipalities, from Belluno to Naples and the governors of Veneto and Friuli Venezia Giulia.

On 20th May 2013 in Padua is taking place "One thousand Mayors for Zero Waste", the European Forum of local administrators committed to reducing food waste and energy. http://www.eumayors.eu/agenda_en.html?date=2013-05&id_event=635

- *Waste Watchers Observatory*

http://ihcp.jrc.ec.europa.eu/our_activities/public-health/nutrition/jrc-contributes-to-online-survey-food-waste

Survey whose aim is to investigate people's attitudes and behaviour regarding the food they waste. On the 19th of November, the online survey on food waste developed by JRC-IHCP researchers and experts from the University of Bologna and the Karlsruhe Institute of Technology was launched.

4.2. Barilla Centre for Food and Nutrition (BCFN)

<http://www.barillacfn.com/bcfn4you/bcfn4u-overview/>

The BCFN is an "idea centre" that has focuses on health nutrition and environmental sustainability. Besides issuing a report as a "state of art" referring to all aspects of food and nutrition, it has developed a website section *BCFN4You* to provide information and create awareness, offering suggestions and useful tips for daily living, for the well-being of individuals, society, and the Planet. Among these, food save is one of the issues constantly addressed and tips and simple daily rules are provided in order to create awareness and good behaviours.

4.3. Melasi

<http://www.melasi.it/it/SC/2003/Melasi.html>

After an hard hailstorm that in 2008 hit 50% of apple production, the Melinda agricultural consortium (Trentino Alto Adige Region) has developed a parallel product project called Melasi. These are apples coming from the same region as Melinda but not respecting the esthetical standards of Melinda that are sold at a more convenient price complying to certified quality thus avoiding their waste.

4.4. Buonfine (Coop supermarket food-chain)

<http://www.e-coop.it/web/guest/documento?cmNode=doc00000069004#>

"Buonfine" is the project that Coop launched on a national scale for the recovery for social unsold products. Goods intended as waste are recovered for social purposes. The project is aimed, in fact, to the donation of these products still appropriate for consumption in non-profit organizations active in the social (NGOs) that use them directly making daily meals for their clients.

4.5. Il buono che avanza

<http://www.ilbuonocheavanza.it/progetto.html>

The project is promoted by the voluntary Milan "Friendship Dinner Onlus". It addresses to caterers, institutions and the citizens to diminish the daily food waste through individual behaviour, to promote a sustainable lifestyle, raise awareness about the problem of homeless people. It promotes the creation of a network of restaurants, taverns, clubs, canteens, catering offering its customers the chance to take away the food or the wine not consumed in a doggy bag.

4.6. Pasto buono

<http://www.pastobuono.it/Home.htm>

This is an initiative undertaken by QUI! Group company, whose main business is the supply of meal tickets service. Its foundation has developed the project "Pasto Buono" mainly in the city of Geona. The goal is to reduce food waste from recovering unsold food in the food supply chain and deliver it to NGOs and charities. Through an online form, one (both NGOs and SMEs) can register to the service and be part of the whole demand-offer system. The foundation has the

role of collector of the food and of distributor to charities. The companies adhering to the project benefit from the participation through fiscal reductions. Another way of managing the extra food produced is a prepaid “social card” (similar to meal tickets) to be used by persons in need that can buy food in the SMEs/restaurants etc. taking part to the initiative.

4.7. Banco Alimentare (Italian Food bank)

<http://www.bancoalimentare.it/>

Collecting food surplus from retail, large distribution, food industry to donate to charities and associations.

4.8 FOODSAVING

Network of research institutes namely ALTIS, Università Cattolica, CERGAS, Università Bocconi and Politecnico Milano

www.foodsavingproject.it

4.9 ECR Italy

Efficient Consumer Response: permanent working table on the topic including the most important stakeholders along the supply chain (producers and retailers).

Conclusions

In Italy they throw 20 million tons of food, amounting to 12 billion euro. A non-negligible amount that could be used for important works.

The food waste must be divided between:

- **Edible** - food and drink thrown still edible, hard bread or scraps of vegetables, or foods that do not have aesthetic characteristics, but are perfectly edible.
- **Inedible** - food and drink that lost the organoleptic and hygienic characteristics and so they are destined to waste.

There is a big economic impact represented by a loss of profit from the waste.

A possible solution is to propose at the institutional level a law regulating falling due food delivering.

Another thing to do is to raise awareness in consumer, educating him doing wise choices, even for the preparation, storage and final disposal of the remains.

it is also important to increase the statistical research, not only on a large scale, but also from small to have credible and reliable data are essential for targeted projects.

Another complementary solution is to create a network of initiatives aimed at recovering local food and redistribution as well as to charities for families in need, organizing active citizenship groups.

Retrieving the unsold food.

Each municipality must create a social dispensation, through donations from various sectors of the food chain.

Everywhere, but just everywhere, in our society, in every field is consumed and sold food, the food waste is an ethical, environmental, economic, social and nutrition problem.

Sources

- Istat – Fao – Coldiretti - Nomisma/Pentapolis – Segré/Falascioni Il libro nero dello spreco il cibo –
- Politecnico di Milano, Garrone, Melacini, Perego, Dar da mangiare agli affamati – Slow Food – Istituto Inran – Ministero delle Politiche agricole - .
- http://www.imprendium.it/files/rapportp_per_protocollo_di_milano_sullo_spreco_alimentare.pdf
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- Publications CRPA www.crpa.it
- Findings from FABbiogas project www.fabbiogas.eu