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1 Introduction on bio-waste management in [Italy]

In Italy the national legislation has introduced in 2006 ambitious targets, namely a 65% MSW Source Separation Level (SSL) for each municipality. Today, biowaste, and particularly food waste from residential source separation, is clearly addressed as the first waste fraction to tackle for municipalities planning to reach the very high source separation targets set by the National law. These high SSLs have been easily achieved by thousands of municipalities in Italy, above all through the so-called “kerbside collection programs”, focusing on food waste collection with the typical Italian scheme. In 2021 (last official data available) the total amount of biowaste collected in Italy was 7.4 Mt, that currently accounts for almost 40% of all MSW separately collected and sent to recycling (i.e. including packaging waste and other municipal waste streams).

2 National concept/strategy on bio-waste management

2.1 Legal framework

In Italy, the national legislation, according to the Article 182 ter of Legislative Decree 152/2006 (and subsequent amendments), which implements in Italy the European directive 851/2018 on waste matters, has established the entry into force of the obligation, from January 1st 2022, of the separate collection of organic waste in all Italian municipalities. This obligation anticipates by two years a similar commitment which will be introduced in the rest of the European Union only at the beginning of 2024.

As far as the recycling of the biowaste is concerned, according to the Italian Legislation (D.Lgs 75/2010 and subsequent amendments) the end of waste status is represented by compost, classified as a soil improver and divided into four categories:

- Green Compost (GWC): compost produced from garden waste only;
- Biowaste Compost (BWC): compost produced from biowaste, including both food- and garden waste;
- Sludge Compost (SWC): compost produced including sludge inside the mixture of different feedstock.
- Compost from waste from the agri-food chain: compost produced from digestate of agro-industrial sludge, wastewater and agro-industrial sludge, animal waste, and green waste.

Digestate deriving from biowaste anaerobic digestion is considered a waste, and thus needs to be post-composted in order to get the status of product.

2.2 Waste management programs and strategies

Italy has adopted the targets for reducing biodegradable MSW going to Landfills in accordance with current EU legislation; the 65% MSW Source Separation Level targets and the specific programs adopted by the majority of municipalities for the implementation of biowaste (and other biodegradables) separate collection of food waste are helping to meet the goals. Most Regional MSW Management Programs do suggested a strategy to collect biowaste in the most effective way, such as doorstep.

2.3 National standards and technical guidelines (collection, treatment and use)

Guidelines for separate collection of organic waste have been issued by Regional and District authorities since the mid '90s; the main indications for collecting biowaste can be resumed as follows:

- Collect food waste separately from garden waste

- Collect biowaste (i.e. food or garden waste) through kerbside schemes whenever it is technically and economically possible
- Collect biowaste by using compostable liners only, made of paper and/or compostable plastics that are certified according to the EN13432 standard

2.4 Quality Assurance Scheme (QAS) and National Quality Assurance Organization (NQAO)

A QAS scheme for compost was established by CIC in 2003; the initiative named “CIC Quality Compost Label” (CQL) is the first (and the only, so far) voluntary program for quality compost in Italy, addressed to facilities associated to CIC only.

Currently there are about 50 composting-facilities and 54 products complying with CIC’s QAS scheme and the amount of compost labelled represents more than 33% of Italy’s total compost production.

Since January 2018, CIC has achieved the ECN-QAS, becoming the fourth national association provided with such quality assurance scheme.

3 Source separated collection of bio-waste

In 2021 biowaste collected separately in Italian municipalities has reached 7.4 Mt, made of 5.4 Mt or 92,6 kg/inh/y of food waste, while about 2,0 Mt (or 33 kg/inh/y) are represented by garden waste, thus almost getting to 125 kg per-capita.

Thousands of municipalities in Italy apply the so-called “kerbside collection programs”, focusing on food waste collection. This approach is based on small volume kitchen caddies fitted with biodegradable bags (i.e. compostable bioplastic or paper liners); collection is done at the kerbside (or door-to-door collection) and adopting convenient frequencies aimed at enhancing citizen’s participation. In the last decade the intensive source separation of biowaste (and other recyclables), initially adopted by small municipalities, has been extended to medium/large towns and in metropolitan areas, achieving high participation by the population involved and reaching best-practise performances in terms of amount (average of 120 kg/inh depending on the local context, ranging from 90 kg/inh to 160 kg/inh) and quality of the collected food waste. Among the best practices, it is worth mentioning the high performances achieved since 2014 by Milan, a city of 1.4 million inhabitants located in a metropolitan area of about 3 million.

In 2021, CIC performed more than 1000 waste composition analyses on food waste to investigate the amount and the type of the impurities (non-compostable materials, n.c.m.) that, being improperly delivered by citizens, are sent to the composting and biogas plants together with biowaste. An assessment focusing on those municipalities collecting food waste at the doorstep shows that this strategy allows the best average food waste quality (6,2% n.c.m.).

According to the data collected by CIC, of the 5.4 Mt of food-waste treated in 2021, around 70.000 ton (equal to 1,3% d.m.) is represented by biodegradable and compostable bags fulfilling the compostability standard EN 13432 “Packaging: requirements for packaging recoverable through composting and biodegradation”.

4 Bio-waste treatment (recycling, material/energy recovery)

According to the data provided by the Italian Environment Agency’s annual report and subsequent elaboration by CIC, in 2021 a total of 356 treatment plant were operating in Italy: n° 293 composting plants and n° 63 Anaerobic Digestion (integrated with composting) facilities were in operation recycling biowaste and other

organic waste (sludge from waste-water treatment plants and other organic waste from agro-industries and others) produced in the Country, for an overall amount of 8.3 Mt of waste treated.

The biowaste collected separately in Italian municipalities is recycled in composting facilities (65% of the total amounts treated) while 35% are delivered to AD- and composting plants.

Based on the amounts of waste delivered to Italy's composting- and AD&composting-plants, CIC has estimated that the total production of compost has reached almost 2.1 Mt. Of this compost about 34% is produced under the CIC QAS scheme. CIC Compost Quality Label represents an added value in the compost market. Indeed, biowaste recycling facilities that obtained the CIC Label have constantly improved the product quality and, as a consequence, the confidence by the final user.

5 Application and market

According to CIC's study, almost the 80% of compost produced in Italy is used in the professional agriculture, while the remaining 25% is sold for gardening, green maintenance or landscaping applications. According to the Italian law on fertilizers (D.Lgs 75/2010 and subsequent amendments), compost can be used to produce other organic fertilizers, such as basic growing substrate, mixed growing substrate or organic-mineral fertilizers.

A market investigation performed by CIC in 2022 shows that the mean price for BWC Compost sold in bulk, which is the more common form of compost sales, is around 6 €/t, to a maximum of 15 €/t. The price of a packed material in bags, that is Compost mixed with peat or other kinds of fertilizers, is remarkably higher than 50 €/ton.

6 Expected trends and developments

Due to the progressive expansion of the separate collection services of food and garden waste in an increasing number of municipalities, and considering the growth trend over the last years, CIC estimates that by 2025 about 9 million tons of biowaste will be collected separately, equivalent to 150 kg-per-capita and year.

In 2018, the Italian Ministry for Economic Development promoted an important decree supporting the production of Biomethane to be used as a fuel for vehicles. Last October 2022, another important law on biomethane has been approved by the Italian Government, which includes incentives for the construction of new plants for the production of biomethane, fueled by agricultural matrices or organic waste. The Italian biowaste collection and recycling sector is considering that of Biomethane as a new strategic challenge to take up. As of December 2021, 16 AD facilities (mostly CIC members) do upgrade biogas to biomethane and have produced around 140 Mm³ of "Advanced fuel". The biomethane production from biowaste are growing up continuously and we can set a concrete outlook of 250 Mm³ until the next few years.

7 Contacts and sources of information

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About CIC – Italian Composting and Biogas Association

The Italian Composting and Biogas Association (CIC) unites public and private compost producers, local authorities and others involved in compost production, like machinery and equipment constructors, growing media producers, research bodies, etc.

Since the very beginning, in 1992, CIC's mission has been to enhance recycling and prevention of biowaste, share knowledge and know-how between CIC's associates, enhance compost quality and market, perform technical training for the composting sector, assist government bodies in improving biowaste recovery.

CIC members are:

- Ordinary members representing biological treatment facilities such as composting and/or anaerobic digestion plants treating mainly organic waste from separate collection;
- Associate Members representing companies that are not directly managing waste treatment plants;
- General Association Members from the public and private sector involved in MSW management and recycling.

By end of 2022, CIC's Ordinary Members are 91, Associate Members 49 and General Association Members are currently 2.

More info on: www.compost.it www.compostabile.com
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International activities and memberships:

CIC is a founding member of the **European Composting Network (ECN)**.

CIC strongly supports the activities of **ISWA** – the International Solid Waste Association, chairing the Working Group on Biological Treatment of Waste

CIC is a founding member of the **World Biogas Association**.

CIC is Worldwide Ambassador of **Ecomondo**, the leading Exposition on Green Economy, Waste Management and Recycling technologies in the Mediterranean Area.

CIC is a founding member of the **Mediterranean Compost Network**.

CIC is partner of USCC during the **International Compost Awareness Week**