Italian Composting and Biogas Association

Annual Report on Biowaste Recycling

November 2017

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Key data about the biowaste sector

The Italian key numbers of separate collection and recycling of biowaste in 2015[1]

SEPARATE COLLECTION OF BIOWASTE	***6.100.000 t*** *total biowaste (food- and green-waste) separately collected*
	43,3 % *percentage of biowaste with respect to the total separately collected waste*
	more than 100 kg/inhab/yr *per-capita amount of food- and green-waste separately collected*
	+6,1% *increase of separately collected biowaste with respect to 2014 (+350.000 t)*
BIOWASTE RECYLING	***308 Plants*** *261&47 Composting and AD&Composting Plants*
	275 x 10^6 Nm^3 Biogas *produced in DA&Composting Plants*
	1.800.000 t Compost *produced in Composting and DA&Composting Plants (CIC's estimations)*
	33% *percentage of Italian Compost awared with CIC's Quality Label*
	3,5 Mt CO_2 eq *carbon dioxide reduction with repect to landfilling thanks to biowaste recycling*

[1] CIC's data are based on the Italian Environmental Agency's (ISPRA) annual report for year 2016 named "Rapporto Rifiuti Urbani 2016"

Foreword

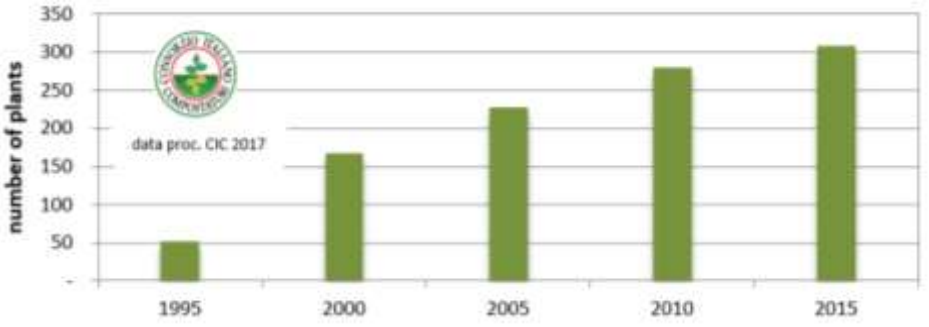
This report outlines the state of the art of the separate collection of biowaste and the recycling sector represented by composting and biogas production in Italy.

In February 1997 Italy adopted the National Framework Law (National Decree n° 22) reorganising the basic framework conditions and the strategic outlook for Municipal Solid Waste in the whole country. This law acted as a fundamental driver to renew MSW management in over 8400 Italian municipalities; it established extensive EPR (Extended Producer Responsibility) schemes for packaging waste and specific hazardous waste (such as batteries, pharma and others) and also boosted separate collection of organic waste.

In the two decades between 1997 and 2017 the amount of organic waste collected separately increased by a factor 8. The effect can be clearly seen on the development of an industrial sector of composting and biogas facilities recycling organic waste, manly food-waste and green-waste, a sector that boomed from about 30 facilities in year 1997 to more than 300 facilities in 2017, with a total treatment capacity higher than 8,5 million tons.

In 2015 (the last official data by the Italian Environmental Agency - ISPRA) nearly 6,1 million [metric] tonnes of food- and garden- waste were collected separately in Italian municipalities, accounting for 100 kg per-capita and year. Today Italians collect separately 48% of all MSW with peaks of about 70% in the Regions of Veneto and Trentino-South Tirol (two best-performing cases with a population of about 6 million) and other three Italian Regions placed at about the 60% recycling (and hosting a population about 13 million).

Figure 1: *Number of plants recycling organic waste in Italy*



The 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.

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.

In November 2017 CIC's Ordinary Members are 79, Associate Members 48 and General Association Members are currently 2.

NATIONAL CIC ACTIVITIES

CIC's 25th anniversary

On 24th May 2017 the Italian Composting and Biogas Association 'CIC' celebrated its 25th anniversary with an interesting event in Rome.

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.

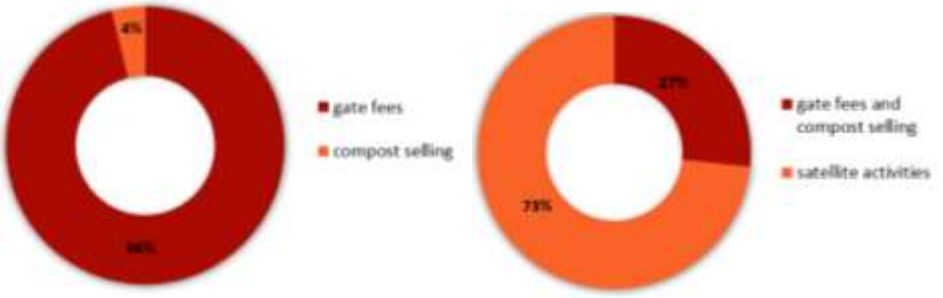
During these 25 years, thanks to the separate collection and composting, more than 65 Mt of organic waste were diverted from disposal, avoiding a landfill space 100 Mm^3, about 5 times the Coliseum in Rome. In the same period 23,5 Mt of compost were produced, substituting about 300'000 t of N, 190'000 t of K and 170'000 t of P on the fertilizer market; hence the use of compost has substituted chemical fertilizer in the farming sector for a value of 650 M€. In addition, thanks to the use of compost, 7 Mt of organic matter were stored in soils, giving a significant contribution to fighting erosion and loss of productivity of Italian farmlands. The recycling of organic waste helped also to avoid the emission of more than 44 Mt of CO_2equ.

The economic impact of the recycling sector of biowaste

After 25 years of development of waste separate collection and recycling, the industrial sector represented by CIC accounts for 308 biological treatment facilities, with a treatment capacity exceeding 8M tpa. The annual turnover generated by all of these facilities exceeds 450 M€, including the revenues for average gate fees and compost selling. If the survey is extended to the supply chain including the activities of separate collection of biowaste and other activities linked to the sector of

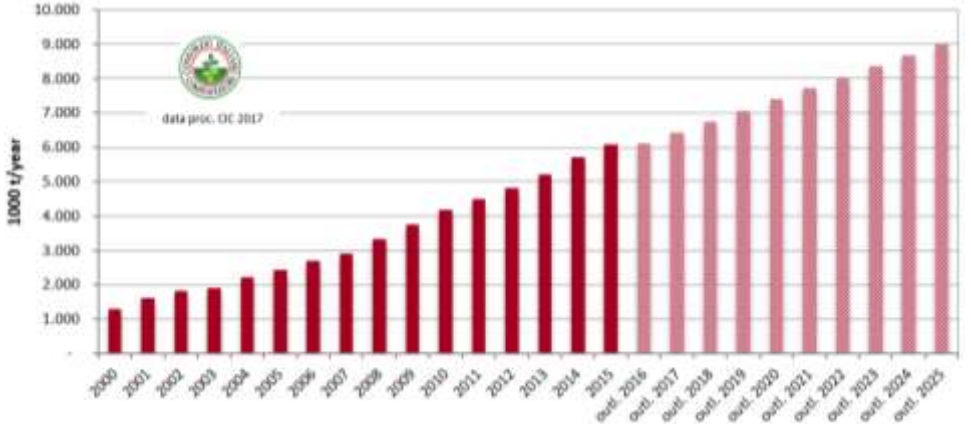
composting and biogas production, the annual turnover generated in 2015 by this important recycling sector would be 1'700 M€[2].

Figure 2: *Turnover generated by the organic waste recycling sector*



The amount of biowaste collected separately in Italy rose about 10% annually from year 2000 to 2015; based on these data CIC estimates that by year 2025 about 9 Mt of biowaste will be recycled into biogas and compost, contributing significantly to reach the Circular Economy Targets for Italy.

Figure 3: *Separate collection of food-waste and green-waste of MSW in Italy*



[2] Based on the results of the Althesys Strategic Consultant survey for CIC realised in 2015.

CIC's cooperation in Italy

CIC's technical office has a wide range of skills that allows the Association to cooperate both with Italian Authorities and Ministries and with other stakeholders and key-players engaged in supporting the sustainable management of MSW.

In recent years, CIC has started specific research projects and cooperation initiatives with different EPR schemes and producer-associations such as:

- CiAl, which is the Italian National Consortium in charge of recycling aluminum packaging collected by Italian municipalities through separate collection of municipal waste

  www.cial.it

- Comieco, which is the Italian National Consortium for the Recovery and Recycling of Cellulose-based Packaging

  www.comieco.org

- COREPLA, which is the Italian National Consortium for the Collection and Recycling of Plastic packages

  www.corepla.it

- RICREA, which is the Italian National Consortium for Recovery and Recycling of steel packaging

  www.consorzioricrea.org

- RILEGNO, which is the Italian National Consortium for the Collection, Recovery and Recycling of wood packaging

  www.rilegno.org

- Assobioplastiche, which is the Italian Association for Bioplastic and Biodegradable and Compostable materials

  www.assobioplastiche.org

European Compost Network

The European Compost Network (ECN) is a European non-profit membership organisation promoting sustainable recycling practices in composting, anaerobic digestion and other biological treatment processes of organic resources. The Italian Composting and Biogas Association (CIC) is one of the founding members of ECN.

Representing Europe's biowaste recycling sector: ECN is a membership organisation with 70 members from 28 European Countries. Via the member organisations, **ECN represents** more than 3000 experts and plant operators with **more than 30 million tonnes of biological waste treatment capacity**.

ECN purpose is to work with practitioners, researchers, technicians and policy makers to deliver integrated organic waste recycling solutions that generate high quality products for the benefit of the environment and the users of the recycled products. ECN supports the policy objectives of the European Union through its activities and with its network of knowledgeable experts. ECN directly assists Member States in developing waste management plans and policies that drive them away from large scale landfilling and into the recycling of organic resources. ECN also serves as focal point for developing EU quality standards for bio-waste treatment and compost production; it is a network for the organic waste recycling sector in Europe, as well as the emerging bio-based economy.

ECN Objectives

The objective and the main focus of ECN are to promote knowledge about best practices throughout Europe for the establishment of sustainable systems for organic waste management through integration of policies and strategies, technological development and improvement of operations.

ECN Activities

Providing information of all aspects within the field of activity of the network to policy and decision makers on national and European level.

- Exchange knowledge and experiences in the practice of collection, treatment, recycling, application and marketing of organic wastes.
- Promoting scientific research and development activities and their co-ordination between the European countries and making available the results, especially the related practical aspects.
- Organising conferences, workshops, seminars, education and training courses etc. on an international or regional level and supporting such events organised by other associations active in the range of biological waste.
- Establishing and maintaining relations with other international or national organisations whose activities are related to organic waste management

Quality Assurance Scheme for Compost and Digestate

With the publication of the ECN Quality Manual 'ECN-QAS - European Quality Assurance Scheme for Compost and Digestate' in October 2014, the European Compost Network (ECN) laid down harmonised requirements for national certification bodies and quality criteria for recycled materials from organic resources. The aim is to facilitate the free cross-border movement of composts and digestate made out of recycled bio-wastes within the EU. It also supports European policy initiatives setting end-of-waste criteria for compost and digestate within the Waste Framework Directive and revisions to the Fertilisers Regulation.

The ECN-QAS is registered as Trade Mark for certified quality assurance organisations, compost and digestate products at the European Register of Community Trade Marks ('OHIM 2012/210: TM No 011007168').

International activities or memberships

CIC is a founding member of the **European Composting Network** (**ECN**). ECN is the leading European membership organization promoting sustainable recycling practices in composting, anaerobic digestion and other biological treatment processes of organic resources.

www.compostnetwork.info

CIC strongly supports the activities of **ISWA** – the **International Solid Waste Association**, a global, independent and non-profit association, working in the public interest to promote and develop sustainable and professional waste management worldwide.

www.iswa.org/en/169/working_groups.html

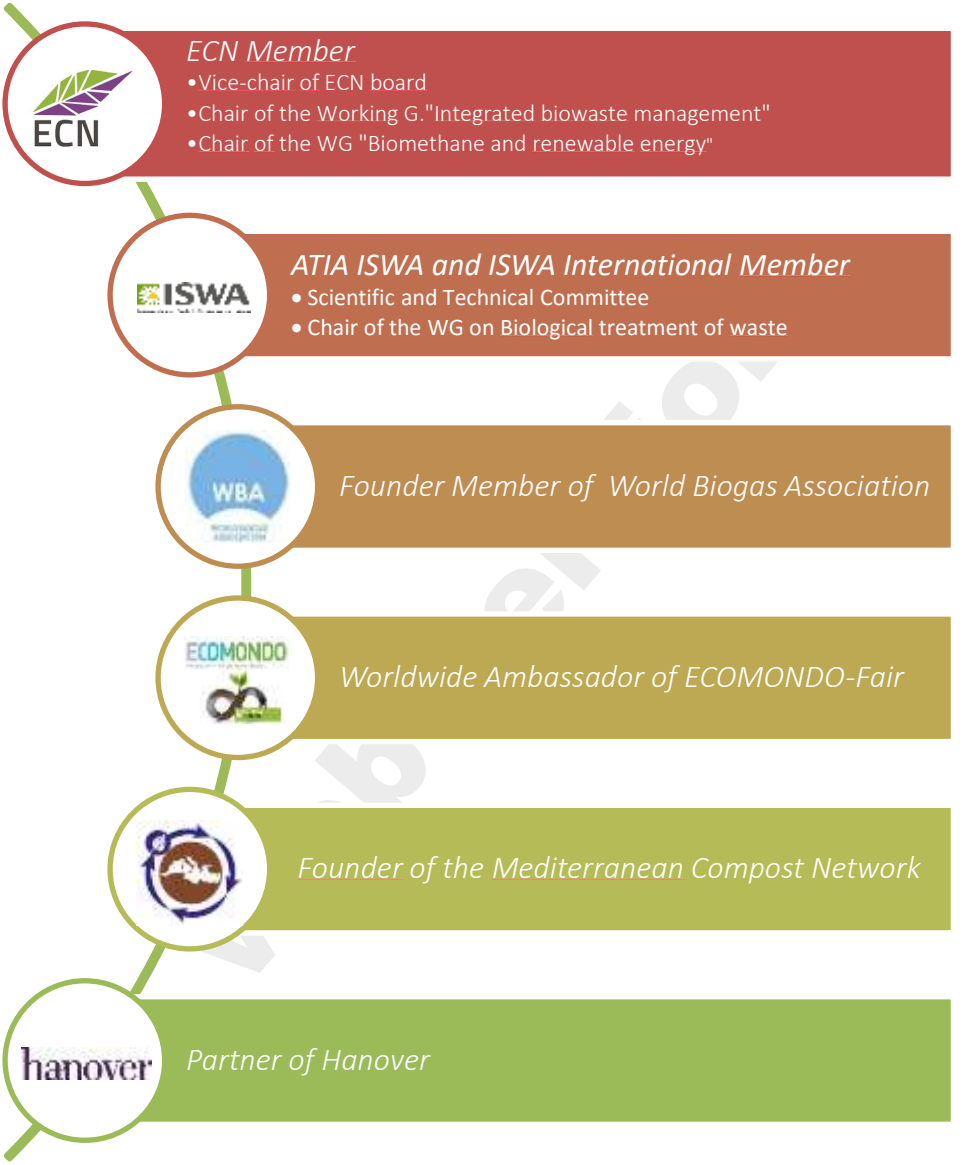
CIC is a founding member of the **Word Biogas Association**. The Association is dedicated to facilitating the adoption of biogas globally as an essential step to meet the sustainable development goals of the Paris Agreement.

www.worldbiogasassociation.org

CIC is a founding member of the **Mediterranean Compost Network**. The Association, involving companies, experts and local authorities, promotes initiatives for recycling of biowaste by means of separate collection, quality compost production and its use in the soils of Mediterranean countries.

www.medcompost.net

CIC has recently started lobbying activities in **Brussels** (Belgium) in cooperation with ECN - European Composting Network, so to steer EU politics towards effective scheme for biowaste collection and push for **clear targets, obligation and incentives** for member-states to recycle biowaste into quality compost and biogas as fundamental bricks of the Circular Economy approach in MSW management. CIC is supported by Hanover (**www.hanovercomms.com**) which offers to CIC and ECN high level advisory and logistics support in its premises.


ECN Member
•Vice-chair of ECN board
•Chair of the Working G."Integrated biowaste management"
•Chair of the WG "Biomethane and renewable energy"
ISWA
ATIA ISWA and ISWA International Member
• Scientific and Technical Committee
• Chair of the WG on Biological treatment of waste
WBA
Founder Member of World Biogas Association
ECOMONDO
Worldwide Ambassador of ECOMONDO-Fair
Founder of the Mediterranean Compost Network
hanover
Partner of Hanover

Ecomondo 2017

Ecomondo is the leading annual Exposition in the Mediterranean Area focusing on Green Economy, Waste Management and Recycling technologies. Currently Ecomondo is expanding to Latin-America and looking for partnerships in Asia and Eastern Europe.

CIC is **Worldwide Ecomondo Ambassador** promoting new business opportunities, participating in roadshows, training sessions and specific events organized by Ecomondo both in Italy and abroad.

www.ecomondo.com

Find out **CIC's events during ECOMONDO 2017** on our website **www.compost.it** or using the QR code.

Facilities for recycling organic waste

Composting and AD-plants

Over the last 25 years an industrial sector for biowaste recovery has developed and consolidated in Italy. In the last few years the number of recycling facilities increased by 3-4% each year and in the last decade there has been a continuous growth in the number of anaerobic digestion plants, which increased by 7 times.

The development and expansion of this important industrial sector (in the decade 2005/2015) is also proved by the rise in the average capacities of biological treatment facilities, with a reduction of the facilities below 10.000 tpa (small-scale) and an increase of the number of facilities between 50.000-100.000 tpa (medium/large-scale).

In 2015, there were 261 composting plants and 47 AD&Composting facilities designed to recycle biowaste and other organic waste[3] (Tab. 1). The industrial sector has reached a total treatment capacity of about 8,1 Mtons, sufficient to recycle all organic waste separately collected in Italy. Despite an overall treatment capacity already able to face the future growth of separate collection, an unbalanced distribution of the facilities is observed, with a growing demand of new installation above all in Southern Regions.

The ten largest facilities exceed 100.000 tpa capacity each and together they can treat up to 2 Mtons, equal to 25% of the total treatment capacity existing in Italy in 2015; these jumbo plants all are members of the Italian Composting and Biogas Association.

The number of composting (only) facilities in the last 10 years is apparently declining, due to the rise of AD&Composting facilities. In 2015 the 64 composting facilities associated to CIC had a total treatment capacity of about 2,2 Mtons with an average acceptance of 37.000 tpa. The number of AD&Composting plants constantly increased in the last decade; in 2015, 47 AD-plants have been realized with a total

[3] Farm AD facilities (those utilizing manure, slurry and residues from agriculture as feedstocks) are not included in this survey.

authorized capacity of 3 Mt. Most of these plants integrate AD with (post) composting of digestate. Currently, there are 21 AD facilities out of 47 associated to CIC, with a total treatment capacity of 2,15 Mtpa, thus representing about 70% of the current capacity for anaerobic digestion of biowaste in Italy.

Figure 4: *Waste recycled at composting (top) and AD&Composting (bottom) facilities*

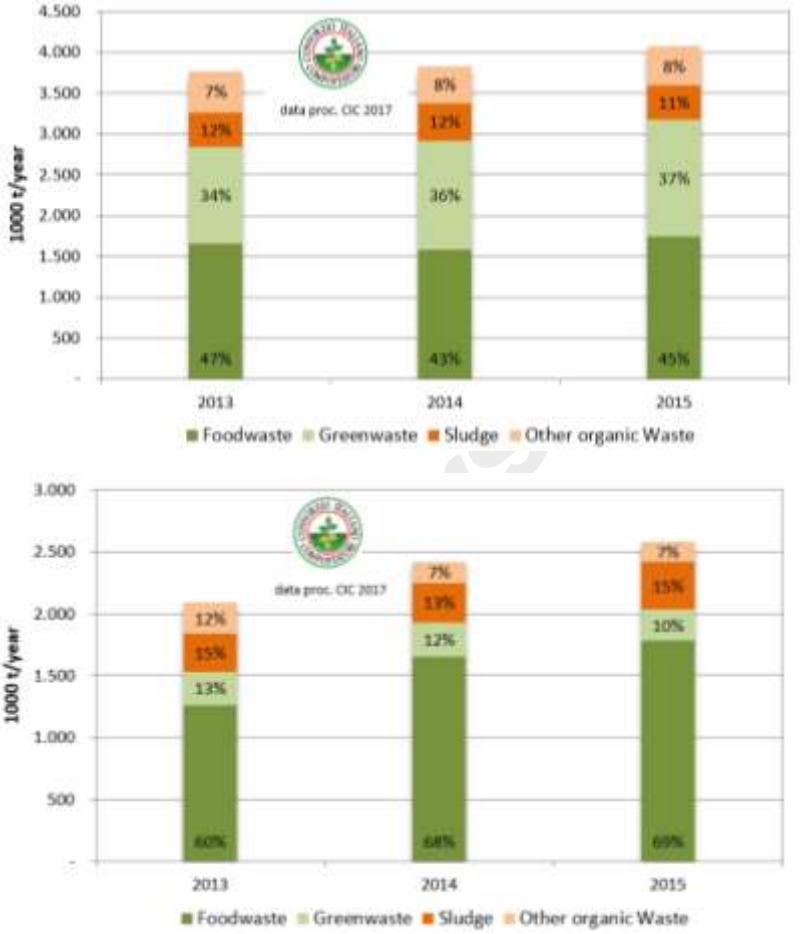


Table 1: *Composting and AD&Composting plants in Italy, 2015*

Italy 2015	Composting facilities				Biogas facilities			
Plants per Region	Plants (N)	Plants with QAS	Authorised (1000 tpa)	Treated (1000 tpa)	Plants (N)	Plants with QAS	Authorised (1000 tpa)	Treated (1000 tpa)
PIEMONTE	19	2	409	214	7	1	424	291
VALLE D'AOSTA	3	0	13	12	0	0	-	-
LOMBARDIA	65	9	958	931	10	1	643	572
TRENTINO ALTO ADIGE	10	0	45	37	7	0	67	51
VENETO	30	2	445	368	9	2	896	757
FRIULI VENEZIA GIULIA	11	1	200	47	1	0	200	215
LIGURIA	5	0	19	19	0	1	-	-
EMILIA ROMAGNA	17	4	512	426	7	3	525	489
TOSCANA	18	4	398	410	0	0	-	-
UMBRIA	5	1	181	146	1	0	44	34
MARCHE	5	0	143	126	0	0	-	-
LAZIO	15	2	275	209	0	0	-	-
ABRUZZO	7	3	222	143	0	0	-	-
MOLISE	2	0	14	11	1	0	22	25
CAMPANIA	4	0	94	25	2	0	63	52
PUGLIA	9	3	548	398	1	0	87	49
BASILICATA	0	0	-	-	0	0	-	-
CALABRIA	7	1	94	48	0	0	-	-
SICILIA	15	0	293	171	0	0	-	-
SARDEGNA	14	2	262	165	1	1	51	50
North Italy	**160**	**18**	**2.601**	**2.054**	**41**	**8**	**2.755**	**2.376**
Central Italy	**43**	**7**	**998**	**891**	**1**	**0**	**44**	**34**
South Italy	**58**	**9**	**1.527**	**961**	**5**	**1**	**223**	**176**
TOTAL	**261**	**34**	**5.126**	**3.906**	**47**	**9**	**3.022**	**2.587**

The different feedstocks treated in Composting and AD&Composting plants

Italy's biological treatment facilities (including composting and AD&Composting plants) mainly recycle food- and green-waste, but do accept regularly other organic fractions such as sludge from waste-water treatment plants and other organic waste from agro-industries and others.

According to the Italian Environmental Agency data (itl. ISPRA), in 2015 the amount of food-waste recycled in composting facilities represented about 45% of all organic waste accepted, green-waste were 36%, sludge were accepted up to 11% and other organic waste from commercial or agro-industrial companies were treated in lower amounts (about 8%). The situation in AD (and post-composting) plants was remarkably different with larger amounts of food-waste (69% and more) and reduced amounts of green-waste (10 %).

Food-waste and green-waste collected separately in Italian municipalities were recycled mostly in composting facilities (61% of the total amounts treated) while 39% were delivered to AD&Composting plants (Fig. 6).

Figure 5: *Different types of organic waste recycled in Composting (left) and AD&Composting (right) facilities in Italy - 2015*

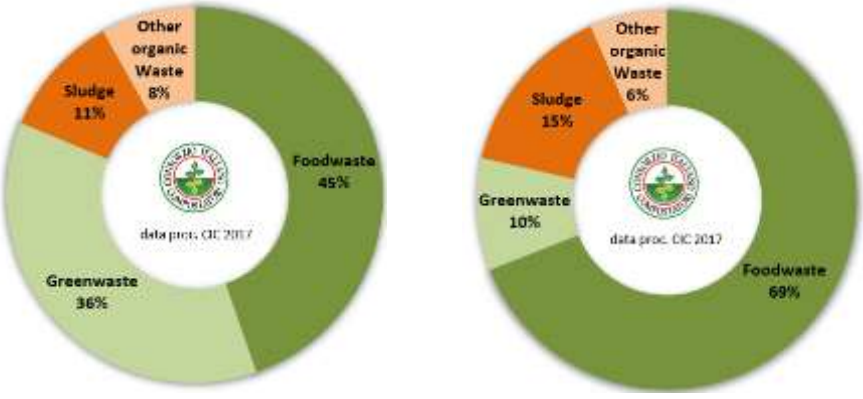
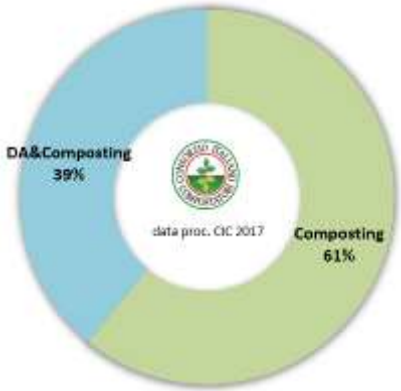


Figure 6: *Recycling of food- and green-waste in Italy - 2015*



Production of quality compost

According to the Italian Legislation, compost is defined as a soil-amendment. Compost is divided into three categories, recognized as "End-of-Waste" according to the input feedstock:

- ***Green Compost (GWC):*** compost produced from green-waste only;
- ***Biowaste Compost (BWC):*** compost produced from biowaste, including both food- and green-waste;
- ***Sludge Compost (SWC):*** compost produced including also sludge inside the mixture of different feedstock.

The Italian standards for End-of-Waste compost are set by the national Law on Fertilizers (D.Lgs 75/2010 and subsequent amendments), and can be divided into agronomical parameters (pH, moisture content, Carbon and organic Nitrogen, etc...), environmental parameters (heavy metals, physical impurities), sanitization parameters (*Salmonella* spp., *E.coli*) and maturity parameters (Germination Index).

On the amount of waste delivered to Italian composting and AD&Composting plants, CIC has estimated that the total production of compost reached 1,76 Mtons in year 2015. The different categories of compost produced in 2015 are shown in figure 8.

CIC's Quality Assurance Scheme - QAS for compost

In order to support the development of the biowaste management sector, CIC has introduced in 2003 the first voluntary program for quality compost in Italy, addressed to its associated companies. This QAS, named "CIC Quality Compost Label" (CQL), aims to assess the quality of compost produced by CIC's members.

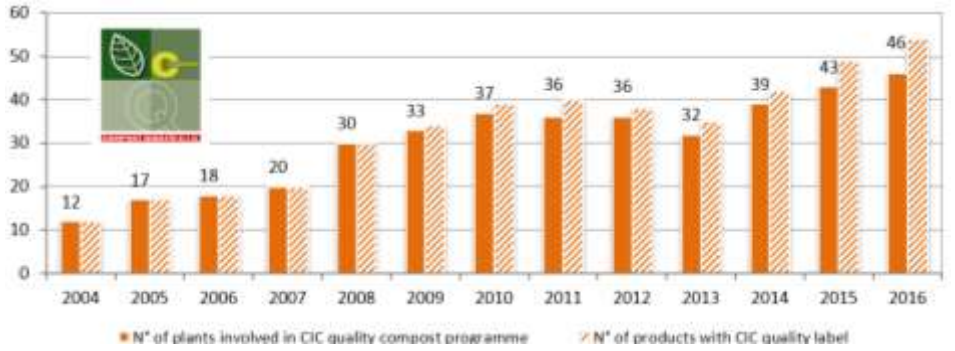
The standards applied in the rules of CIC's Quality Label are a useful instrument both for the producers of compost, as a way of monitoring the achieved quality standards, and for the consumers, who can verify the quality of the compost used.

Since 2003, over 2.500 samples of compost were taken and analyzed within the CIC QAS system. Compost samples are taken by qualified operators, trained and authorized by CIC and independent from the treatment plant. Samples are analyzed by Laboratories accredited by the Italian Ministry of Agriculture (MIPAAF) for analysis of soil improvers and growing media.

Since the very beginning, there has been a growing interest in quality compost and a consequent significant increase of products labeled with the CIC's Label. Between 2003 and 2016 the number of composting facilities awarded with CQL became almost 4 times higher and it increased by 18% in the last 3 years. The increase can be explained as follows:

- Substantial communication and marketing investments as well as public awareness activities and sharing of information;
- Convenient price of compost compared to the mineral fertilizers one;
- Incentives for compost use in organic depleted soils, including the use of Compost in Rural Development Plans so to restore organic matter content;
- Extensive availability of the product.

Figure 7: *Plants and Products awarded with CIC QAS*



Hence, by the end of 2016, the amount of compost labeled represented about **590.000 tons, equal to 33% of the Italian total compost production**. Most of the products awarded with CIC's Quality Label are represented by biowaste compost (34 products, around 420.000 tons of compost produced from biowaste), against 11 green compost products, with about 70.000 tons of compost produced.

In year 2017, there are 51 composting-facilities complying with CIC's QAS, producing 58 awarded products (See Section "Facilities of CIC Ordinary Members").

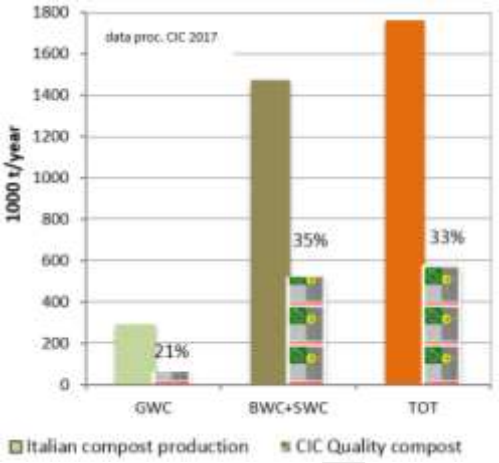
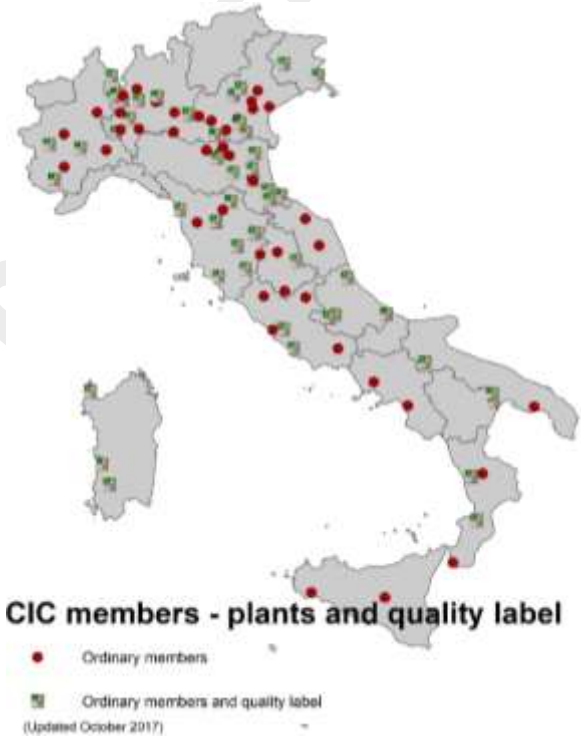


Figure 8: *Production of compost from Green-waste (GWC), Food-waste (BWC) and Sludges (SWC) in Italy.*



The market for compost

Around 70% of compost produced by the Italian biological treatment plants is used in agriculture, while the remaining 30% is sold for gardening or landscaping purposes. Thanks to the last update of the Italian law on fertilizers, compost can be used in other organic fertilizers as basic growing substrate, mixed growing substrate or organic-mineral fertilizer. Together with a considerable increase in the use of compost, everyone became accustomed to this product. This is probably due to:

- **Information** campaigns put in place by compost producers;
- **Higher price of mineral fertilizers** than the one of compost;
- **Economic incentives** for reintegrating the organic matter in poor soils (only in some Italian Regions);
- **Easy availability of a large amount of compost** almost everywhere in the Italy.

According to CIC information, the whole amount of compost produced in Italy is used within the national borders. It has to be noted that CIC's compost Quality Label represents an added value to compost marketing. Indeed, compost plants which obtained the CIC's Label constantly increase the quality of the product and, as a consequence, the final user is more satisfied by the compost.

A market investigation performed by CIC shows that the price of the quality compost depends on the "final product packaging". The mean price for compost sold in bulk is around 10 €/t and the price fluctuates between 5€/t and 15 €/t. Price fluctuation is probably related to the transport service cost, which is often paid by the composting plants. On average, the price of a packed material in bags, that usually is compost mixed with peat or other kinds of fertilizers, is remarkably higher than the bulk material and reaches prices of 120 €/t and above.

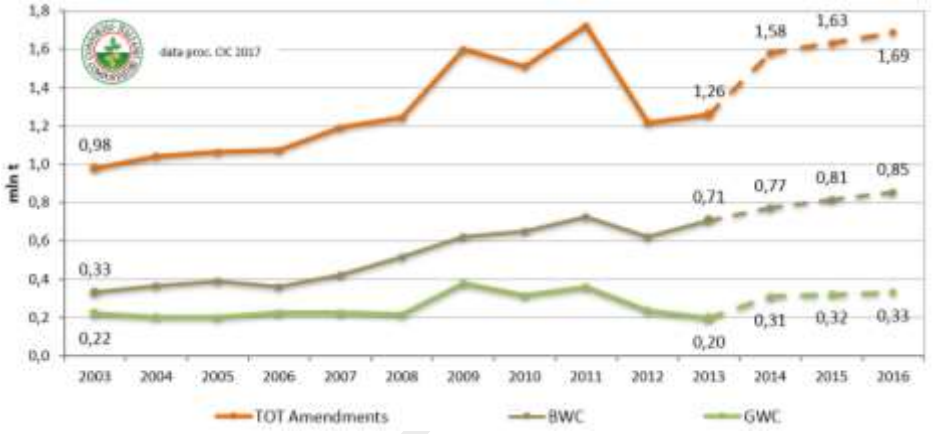
According to the data of annual surveys performed by the Italian statistical office - ISTAT - on the distribution of fertilizers for agriculture, the total amount of fertilizers used in agriculture is constantly decreasing. It passes from 5,2 Mt in 2003 to 4,1 Mt in 2013[4] (-21%). In spite of this general decreasing tendency, the amount of

[4] The most recent data, published by ISTAT in January 2015, refer to 2013.

amendments used in agriculture increases (+31,6%). Moreover, the huge increase in using biowaste compost (BWC) is impressive, rising for more than 115% in ten years, while there is just a slight increase in green waste compost usage.

Based on these data, CIC estimated that in 2016 about 0,85 Mt of BWC and 0,33 Mt of GWC were used in agriculture, representing about 70% of the amendments used in this sector.

Figure 9: *Amounts of Amendments, Biowaste compost and Green-waste compost used in the Italian agriculture sector*



Production of biogas and upgrading to biomethane

According to ISPRA data on the amount of organic waste being recycled at AD facilities, the total amount of biogas produced in 2015 is estimated in $275x10^6$ Nm^3; this production does not include the biogas production from agricultural facilities, which mainly treat energy crops, crops residues and agro-industrial sludge.

Most AD facilities produce electricity and sell it to the National Electricity suppliers. Only few facilities use the excess of heat for district heating or supplying selected industrial activities.

The potential of biomethane

In 2013, the Italian Ministry for Economic Development promoted an important decree on incentives for producing biomethane. This legislation opens new development perspectives for renewable energies from biowaste, as this biofuel could be used for vehicles as substitute of fossil fuels and to replace the natural gas in domestic, commercial and industrial utilities. Biomethane production from biowaste is also an important contribute to reach the objectives established by the EU Directive 2009/28 on renewable energies, with the aim to reduce green-house-gases emissions and promote a "green" transportation system.

The Italian biowaste collection and recycling sector is now considering biomethane as a good opportunity for green incentives and a new challenge for CIC's composting and AD plants. Thus CIC has developed and is now implementing a Biomethane Label "Biometano Fertile" to assess the quality of biomethane produced in composting and anaerobic digestion plants.

Biomethane from biowaste could strongly transform the organic waste recycling sector in Italy, as anaerobic digestion plants would transform the organic waste into both compost and biomethane. Several companies in Italy have recently realized a half scale upgrading devices to upgrade biogas to biomethane and, in July 2017, the first full-scale Italian AD&Composting plant, a CIC Member, has started to inject biomethane into Italy's national gas network. The outlook is to produce 32 million cubic meter of biomethane per year.

If the separate collection of biowaste were evenly widespread across the Italy, it would be possible to recycle 8-9 million tons of biowaste per year. From this amount, a Biomethane production exceeding $500x10^6 Nm^3$ could be a realistic evaluation, thus almost doubling the current production.

Furthermore, CIC estimates that, if the biowaste produced nowadays were fully recycled through Anaerobic Digestion, the biomethane produced could be used as fuel for the 80% of the waste collection vehicles and could reach the 100% if the per-capita biowaste production increases.

Separate collection of biowaste in Italy

The Italian approach for Source Separation of biowaste

Recycling of municipal waste has always been suggested by the European waste management hierarchy, and consequently by the Italian legislation, as the most favourable option, compared to incineration and landfilling of mixed waste. In Italy, national legislation has foreseen ambitious targets, namely a 65% 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 SSL targets set by the National law. These high SSL levels have been easily achieved by hundreds of municipalities in Italy through the so-called "*kerbside collection programs*", focusing on food waste collection with the typical Italian scheme.

This approach is based on providing small volume kitchen caddies fitted with biodegradable bags, adopting a collection at the kerbside (or door-to-door collection) with convenient frequencies aimed at enhancing citizen's participation. Door-to-door collection program requests that households and commercial activities are responsible for the maintenance and cleaning of the receptacles (buckets, bins, etc.) assigned to them. This can be achieved by providing each household/producer with specific tools as bags that can be used to easily manage the more putrescible and critical fraction of waste (i.e. food-waste).

Some key elements can be identified in order to maintain the economic viability of intensive collection schemes. Firstly, food waste collection must be designed to be part of an integrated scheme, and not just an additional service. In this respect, the key element is to keep collection frequencies of residual waste low, namely once a week or even fortnightly. In Northern Italy food waste can be collected twice a week, to provide comfort for citizens, although some recent experiences based on the use of vented kitchen caddy show that even a weekly collection can be fine, apart in summer.

Figure 10: *Scheme applied in Italy for the collection of food waste at the kerbside in semidetached buildings and in apartments blocks*

Then, vehicles are another key issue. According to the Italian kerbside scheme, small vehicles with no compaction, low fuel consumption and a single operator both driving and collecting waste can lead to important savings comparing to large compacting trucks.

Figure 11: *A non-compacting vehicle with single driver, for the manual collection of food waste in buckets*

In the last decade intensive source separation of biowaste (and other recyclables) has been extended also to medium/large towns in Italy and in metropolitan areas, achieving high participation by the population involved and reaching best-practise

performances in terms of amount (between 70 and 120 kg percapita) and quality of the collected biowaste.

Many Italian cities are involved in intensive collection schemes for food-waste; among these cases it is worth mentioning the high performances achieved since 2014 by **Milan**, a city of **1,4 million inhabitants** located in Italy's most economically developed region Lombardy, has become a beacon for other metropolitan cities worldwide; currently Milan collects about 140.000 tpa of food-waste, recycled at a biogas and composting facility.

The amount of biowaste collected in Italy

The separate collection of recyclables waste in Italian municipalities (including biowaste, packaging waste, WEEEs and others) has reached a quota of 47,5% of all MSW managed in 2015 (29,5Mtons/yr), with a rather stable total production of waste. The collection of biowaste currently accounts for more than 43% of all MSW separately collected and sent to recycling (Fig.13). According to CIC surveys in different Italian regions, about 40 million inhabitants are currently sorting food- and green waste.

By the end of 2015 **biowaste collected separately in Italian municipalities**, including food-waste and green-waste, exceeds 6 Mtons with an increase of 6,1% compared to the previous year. CIC estimates that the amounts of food-waste reached 4Mt or 66 kg/pers/yr and 2,1 Mt of green-waste or 34 kg/pers/yr, thus **passing the 100 kg per-capita threshold**.

The trends of separate collection of biowaste and the quantities collected between 2010 and 2015 are shown in figure 13. Lombardy (Lombardia) is the Italian Region that most contributes to the total annual amount of collected biowaste, more than 1,1 Mtons. Smaller Italian regions such as Veneto, Emilia Romagna and Campania collect up to 650.000 tons each. The first seven Regions with the largest amounts of collected biowaste account for 76% of all biowaste collected separately in Italy. Regional data clearly show that collection schemes are more developed in the North, since they started about 20 years ago, while biowaste collection schemes have been

introduced only in the last decade in the South, hence are still in a phase of expansion.

ITALY -2015	Population (inhab)	Biowaste (t/yr)	Biowaste (Kg/cpt/yr)
NORTH	27.754.578	3.385.088	122
CENTER	12.067.803	1.223.962	101
SOUTH	20.843.170	1.462.463	70
ITALY	60.665.551	6.071.513	100

The figures for 2015 and the records from the past two decades confirm the increase in the separate collection of biowaste, with a rate of growth equal to 8% per year. This result derives from the progressive expansion of the separate collection services of food and garden waste in different municipalities. Using the trend recorded in the last 10 years, CIC estimates that by 2020 about 7,1 million tons of organic waste will be collected separately, equivalent to 120kg-per-capita and year, an amount that will increase to 9 million tons in 2025, reaching 145kg per-capita and year.

Figure 12: *Separate collection of MSW in Italy - 2015*

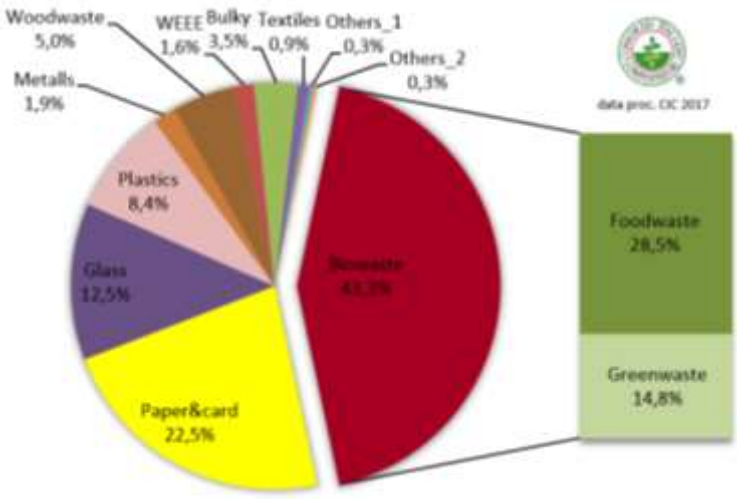


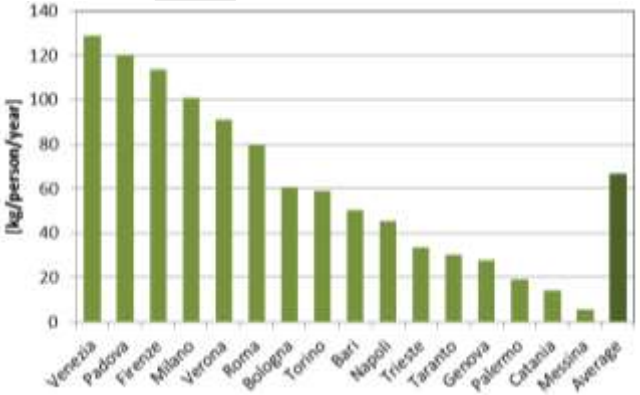
Figure 13: *Separate collection of food-waste and green-waste of MSW in Italy*

The strategic contribution of cities

A survey on Italy's largest cities with a population exceeding 200'000 shows an average collection of 67kg percapita per year of organic-waste (i.e. the sum of food- and green-waste); the amount of organic waste diverted from disposal in those cities accounts for about 675'000 tpa.

Considering the high urbanization of these cities and knowing the performances of best-practise case in collecting food-waste (such as Milan collecting 100 kg/pers) the outlook from intensive collection schemes from these areas is likely to pass 1'000'000 tpa, hence increasing actual amounts by 50%. Significant increases are expected from Cities like Rome (2,8 M people) and other located in Southern Italy such as Naples (1,0 M people), Palermo (0,7 M people) and Bari (0,3 M people).

Figure 14: *Separate collection of biowaste in Italian Cities – year 2015*



Biological treatment of compostable bags

Enhancing separate collection by using compostable bags

Compostable bags are included into separate collection schemes for food-waste since the early '90s in Italy; this approach always aims to make easier the sorting by households and to prevent the presence of traditional plastics by error or negligence into source separated waste, that are potentially a critical factor for composting and AD- facilities.

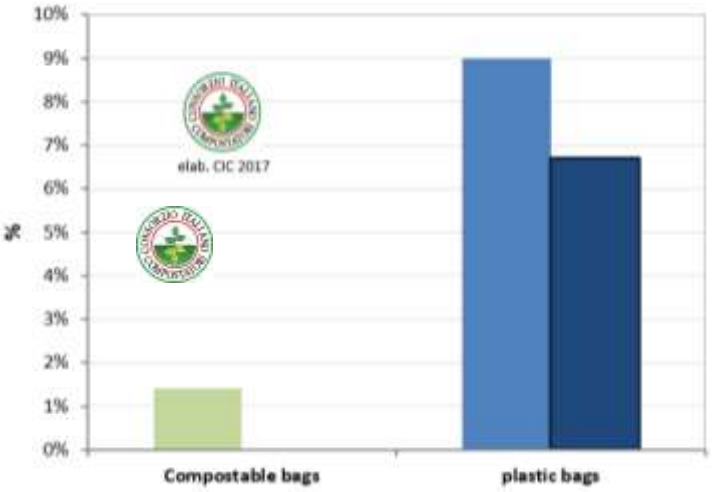
Currently, biobags used for food-waste are divided into bioplastic bags and paper bags. Even if bioplastic bags represent the majority, the amount of paper bags used is continuously growing and they are becoming more common for biowaste collection than the previous years.

According to the results of CIC's analyses[5] on food waste-composition as a function of the type of bags used, when collection at households is carried out with PE-bags, the expected content of non-compostable materials (NCM) is about 9% f.m., while if the collection is performed with compostable bags the level of NCM can drop to 1,4%; hence compostable bags used for separate collection of food-waste can strongly improve the quality of organic waste. There's no surprise that, according to the Italian National Law on waste-management (Decree n° 152/2006), bags and liners for separate collection must comply with the EU-standards on biodegradable packaging materials (received into Italian law as UNI EN 13432:2002).

Therefore, if bioplastics used for separate collection were compostable, the **bioplastic sector** potentially could enhance the recovery process of biowaste delivered to composting and biogas plants. In 2011 Italy approved a specific, national regulatory prescriptions, aiming to reduce the environmental burden of plastic packaging; the prescription specifically forbids standard commercial (one-way) shoppers to be produced in traditional plastics and consequently since 2011 the demand for reusable- and for bioplastics-bags in Italy increased accordingly.

[5] Analyses carried out in year 2011. See also chapter "the quality of biowaste"

Figure 15: *Content of non-compostable materials inside food-waste collected with different bags and liners; the non-compostable materials content is expressed as percentage of the incoming food-waste*.



CASE STUDY: Bioplastics in Italian facilities for biowaste recycling

Around the mid-2000s, Italian districts and municipalities that had implemented intensive sorting schemes for biowaste (and other recyclables) became more aware about the environmental burdens of one-way plastic packaging and items, especially those produced during public events and catering services. Hence, local authorities started to actively promote the use of compostable packaging for food and catering-ware during so called "green-events".

Nowadays, many Italian **local authorities apply low-waste management procedures for public events and for catering services**, which includes the use of re-usable and compostable tableware such as: cutlery, cups, glasses and plates. These procedures aim to maximise recycling of biowaste and to minimise the quantities of waste to be disposed (a practical approach towards "Zero Waste"). Thus **a wide range of bioplastic items**, certified to be compostable according to the EN-13432 standard, are **generally accepted in limited amounts inside the biowaste stream** and delivered to industrial AD- and composting facilities.

A specific advantage of the Italian industrial sector for biowaste recycling is that **AD-facilities are generally applying a post-composting step** of the digestate or the "solid" output from AD. This step allows to treat correctly all types of compostable plastics that would not completely degraded if the biological treatment would be limited to the anaerobic phase. Obtaining a final solid product (such as compost) has significant operational and commercial advantages since compost can be easily stocked, handled, blended with other fertilizers or distributed on soils.

The Italian approach to maximise the recycling of biowaste, including bioplastic items, can be summarised according to three possible layouts for industrial facilities applying composting only or anaerobic digestion integrated with composting, simplified as follows:

Option A: composting only: Most facilities accepting high-quality biowaste (. impurities below 4-5% f.m.) pre-treat the input feedstocks by using just a bag-opener or a "slow mixer" (in the latter case mixing green-waste). Facilities applying a more complex pre-treatment on the input feedstocks tend to treat the rejects aerobically with the aim of minimizing the amounts to be disposed; hence bioplastics - that may be sorted as rejects - are going to be degraded at this step and transformed into organic material and CO_2. "Hard" bioplastic items that should be present at the end of the composting phase are usually recirculated together with wooden bulking agents, hence undergoing a further process that allows them to be fully degraded into the final compost.

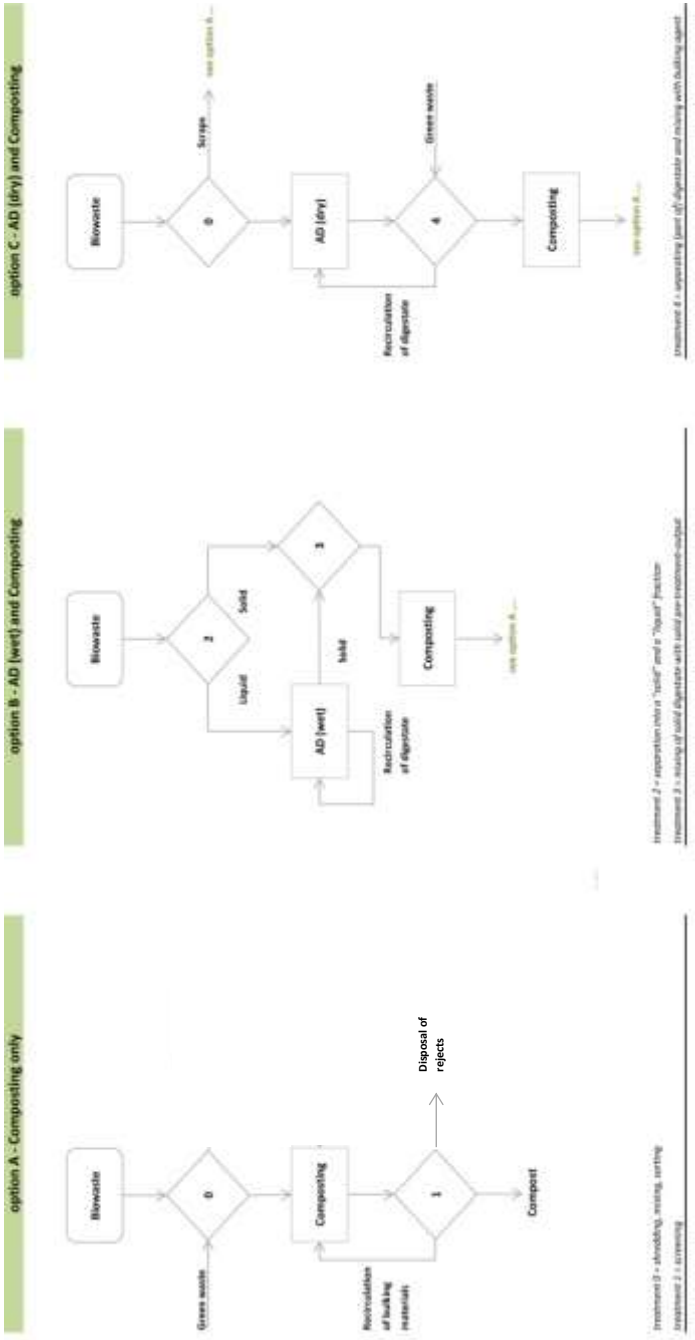
Option B: wet AD combined with post-composting: These facilities apply a more complex pre-treatment, to split the input biowaste into a "solid" and a "liquid" fraction; the solid fraction is treated only aerobically, while the liquid fraction is treated by AD and then further processed aerobically. Hence during the composting phase both the solid-fraction (split during pre-treatment) and the solid-residues from the AD-phase are treated together; thus bioplastics undergo both in AD and composting treatment.

Option C: dry AD combined with post-composting: These facilities do apply the same pre-treatment scheme than Option A; furthermore, differently than wet AD (Option B), the process management regarding rejects and the recirculation of digestate and

wooden bulking materials allows more “solid” bioplastic to be recirculated inside the process lines, maximising the possibilities to be effectively recycled.

According to a detailed investigation/survey - carried out in Italy by CIC during year 2016 – no compostable biopolymers can be detected inside the final compost after the composting process. This means that high temperatures and the duration of the composting process (30-40 days of composting after the AD phase) are able to guarantee the compostability of these biopolymers. Composting process rejects, i.e. oversievings, are represented only by inert, metals and traditional (petrol-based) plastics. So compostable liners and also specific types of compostable bioplastic packaging are accepted by Italian AD&Composting facilities that have upgraded their treatment process in order to effectively guarantee their recycling.

Figure 16: *Layout for managing compostable bioplastics at AD and/or Composting facilities*



CIC's label for compostability

The development of products that combine the features of biodegradability and compostability is one the most innovative progress of the last decade. Italy is proud to be a world leader of a new "Green Chemistry" which produces bioplastics materials and products, that decompose during composting process. However, while the bioplastics market is constantly evolving, the EU legislation regulating its production is limited to the Packaging Directive and the standards of certification of 2002, e.g. the EN 13432:2002 standard. Items made of degradable polymers which decompose during industrial composting process, can be defined as "compostable" if they meet the requirements provided by the EN 13432:2002. According to this standard, a product needs to disintegrates within 84 days and biodegrades within 180 days. As a result, under micro-organism activities, the compostable item would transform into water, carbon dioxide and compost. At the same time, the compostable items need to be compatible with the composting process without affecting the quality of the obtained compost.

CIC started in 2006 a certification scheme on biodegradable and compostable products. The certification scheme ensures the product's ability to turn into Compost during the industrial composting process. Particularly, CIC assesses the compostability by testing materials on a full-scale industrial composting facilities. CIC's compostable certification program meets the European regulation EN:13432 on compostable packaging. The reasons that led CIC to establish the certification program on compostable products are briefly listed below:

- The bioplastics world market is evolving rapidly;
- The quality of incoming biowaste into composting facilities strictly depends upon Non-Compostable Materials (NMC) content;
- Impurity content of biowaste increases treatment costs;
- Biowaste can became an organic fertilizer only if impurities are really low;
- Promote only authentic compostable bioplastics that meet the European standards.

Figure 17: *"Compostable CIC" Logo*

ACCORDING TO THE EN:13432 STANDARD, A COMPOSTABLE MATERIAL MUST COMPLY WITH FOLLOWING FEATURES:
Biodegradability: the capability to be converted into CO_2 by micro-organisms processes.
Disintegrability: the fragmentation and loss of the material inside the final compost.
Absence of **negative effects** on the composting process and on the quality of compost

Table 2: *The EN 13432 basic requirements for compostability*

The "**Compostable CIC**" labelling program requires a third party certification body, to perform audits and sampling of tested products. Therefore, CIC has partnered with Certiquality, a market leader in certification standards. Companies that successfully achieve the compostable certification would be allowed to print the "Compostable CIC" logo on the certified product, and being recognized all across the Europe. This logo helps the final customers to visually identify truly biodegradable and compostable products making a consciousness choice.

Nowadays, more than 40 products are certified with CIC's compostability scheme and 19 companies are licensed to use the Compostable CIC logo. The detailed list of compostable products certified according to the "Compostable CIC" scheme can be found at: http://compostabile.com/prodotti_certificati.html .

"DI*CHE*PLASTICA*6*" PROJECT

In June 2015 **CIC**, in association with **Assobioplastiche** (the *Association for Bioplastic and Biodegradable and Compostable materials*), **COREPLA** (*the Italian National Consortium for collection and recycling of plastic packages*) and **CONAI** (the *National Consortium for Packaging recycling*), has signed an agreement, lasting till the end of 2017. The aim of the agreement is to encourage activities aimed at knowing, supporting and promoting the best environmental management options of biodegradable and compostable plastic packaging. In particular, CIC launched an ambitious monitoring program of more than thirty biological recycling plants in Italy leading to a clear understanding of the mass flow and balance of plastics and bioplastics managed together with the biowaste stream.

This survey, having monitored more than 30% of all biowaste recycling plants, is highly representative of the Italian sector.

During the project CIC has also assessed the acceptability of compostable bioplastics at Italian biowaste treatment plants; the investigations shows a a general acceptability of the compostable biopolymers and the acceptability rises significantly if the bioplastic item complies with the "**Compostable CIC**" certification. In other words, recycling plants managers require the "Compostable CIC" certification.

Considering the constantly growth of the bioplastics market, the project shows that Italian recycling plants for biowaste are developing and adapting techniques and technologies to ensure the complete degradation of compostable items, in order to maximize recycling efficiency.

More info on: **http://www.dicheplastica6.it/**

The quality of biowaste

One of the goals of biowaste collection (mainly food-waste) is the reduction of the amount of non-compostable materials (contamination) for maximizing the recovery through composting and/or anaerobic digestion (AD). Initially, a high citizens participation rates was facilitated providing users with kitchen caddies and plastic bags. However, over the years, this practice has evolved, switching to compostable bags, which have brought a reduction of contamination, and vented caddies, that allow the material to "breathe" and thus reduce odors and molds.

Compost quality is based on feedstock composition and purity. CIC conducts hundreds of waste-audits each year at its members' facilities, for monitoring the quality of organic waste collection. These analyses can be divided into three main groups.

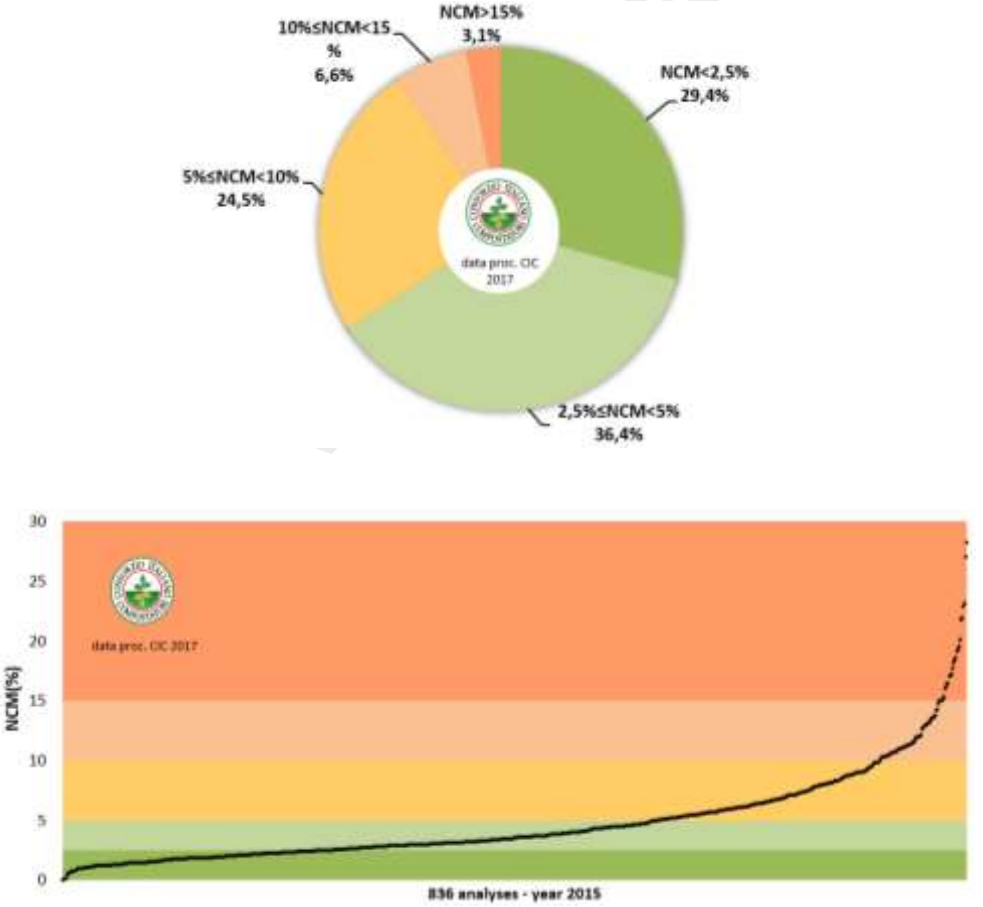
TYPES OF WASTE-AUDITS ON BIOWASTE PERFORMED BY CIC	
1	Composition of incoming food waste, so to determine the percentage of non-compostable materials not suitable for composting
2	Micro analysis which consist product waste composition analysis of the contents of a single bag, for groups of bags of different types of material *(not described in this report)*
3	Analysis on the type of bags used for the separate collection of biowaste, to distinguish the origin and type of material bags are made of

Waste-Audits to assess the quality of food-waste

CIC has set up in 2006 a continuous monitoring activity to assess the quality of source-separated biowaste nationwide and performed about 5000 waste-composition analyses up to year 2015. CIC assesses the percentage (w/w f.m.) of non-compostable fractions present in the incoming waste; the **Non-Compostable-Material** quota consists of different plastic items (i.e. bags, cups, etc.) and other non-compostable materials (i.e. glass, stones, metals, etc.).

In 2015, CIC performed about 835 waste audits on food-waste; the **average non-compostable** quota of biowaste delivered to Italian composting and AD&Composting plants is **4,8% in weight**, with best-practice cases[6] showing less than 2% impurities. The number of waste-audits falling into the five quality classes are shown in figure 20. The average composition of physical contaminants found inside the incoming waste (data not shown) is due to plastic items (42,2%) followed by plastic bags and carriers (23,4%) and a mixture of metals, stones, inert and others.

Figure 18: *CIC waste audits on food-waste collected separately - 2015*



[6]Mostly door-to-door collection with compostable bags distributed to households and other biowaste producers.

CIC's waste-audits also allow to **compare the effectiveness of bring schemes and curbside schemes** in terms of keeping NCM sufficiently low to enhance recycling activities at composting and AD plants. The assessment conducted in year 2015 clearly shows how kerbside schemes significantly reduce the need for pre-sorting of delivered biowaste before recycling the waste; hence kerbside collection also reduces significantly the amounts of residues from the recycling process that need to be disposed of.

Waste-Audits on bags used by citizens for biowaste collection

Plastic bags are a contamination factor in the composting process. The Italian National Law on waste-management (Decree 152/2006 article 182ter) states that "*the separate collection of organic waste must be carried out either with reusable containers, or with compostable bags certified according to UNI EN 13432-2002 standard on biodegradable packaging materials*".

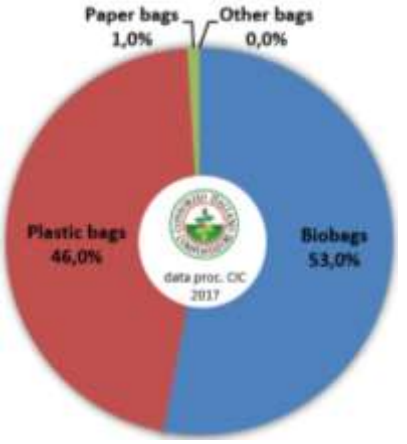
The demand for bioplastic-bags in Italy increased in recent years due to specific regulatory prescriptions aiming to reduce the environmental burdens of plastic packaging. A ban on the use of plastic-bags by retailers and supermarkets was issued in December 2006 and enforced from January 2011. This ban caused a significant reduction of thrown away bags sold in supermarkets (less 50%) as well as the growing use of compostable shopping bags for biowaste collection. Additionally, in recent years products labeled as "degradable", "biodegradable", "oxo-degradable" and "oxo-biodegradable" are proposed to customers and used to promote products made from conventional plastics with additives, thus causing an increase of non-compostable items that are placed on the market claiming to be compostable.

Therefore, CIC started in 2011 to survey nationwide the type of bags used for biowaste collection. Specifically, the analysis conducted by CIC identifies up to 11 types of bags, as detailed in the following list.

TYPE OF BAGS FOR BIOWASTE COLLECTION TRACED BY CIC	
Bags made of polyethylene plastic (PE)	subdivided into shopping bags, transparent bags (usually used for carrying fruit and vegetable), sacks and bags (wrongly) provided by municipalities for biowaste collection
Bags with oxo-degradable plastic additives (PA-OXO)	subdivided into bags and sacks specifically (wrongly) supplied by municipalities for biowaste collection
Bags made of compostable materials (BIO)	subdivided into bags and liners supplied (properly) by municipalities for biowaste collection
Bags made of paper (PAPER)	all types of bags and liners
Bags made of other materials (Other)	bags not fitting the previous types of classification

Going into detail, in year 2015 the technical department of CIC classified nearly 45.000 bags during its waste audits. Of about 100 analyzed bags (see Fig. 21), 53 are proper bags for biowaste collection (53% BIO bags, 1% PAPER bags) but 46 are shopping bags made of traditional plastic or oxo-degradable materials.

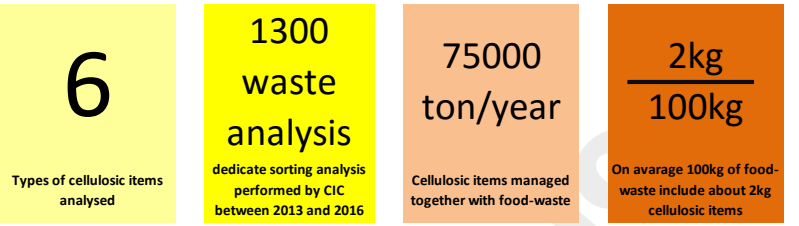
Figure 19: *Waste-audits assessing bags used for collecting food-waste in Italy*



Waste-audits to assess the presence of cellulosic items

CIC started in 2013 a technical cooperation with COMIECO[7] for investigating the different kinds of paper and cellulosic items that can be found inside food-waste from separate collection; more than 1300 waste composition analyses were performed by CIC between 2013 and 2016.

The investigation allows classifying cellulosic items into six different categories: four of which are different types of packaging including multi-layer packaging for beverages, graphic paper and mixed paper (which mainly consist of napkins, tissues, etc.).



The results show that source separated food-waste always contains limited amounts of paper and other cellulose items. Considering the total amount about 20% is represented by packaging items, 7% graphic paper and the remaining amounts are the so-called mixed paper. Multi-layer items are accounted as impurities and represent less than 1,5%. These amounts may be assimilated to organic materials considering the possibility to be degraded in industrial composting processes.

CIC estimated that annually up to 70-90'000 tons of cellulose items are collected together with food-waste.

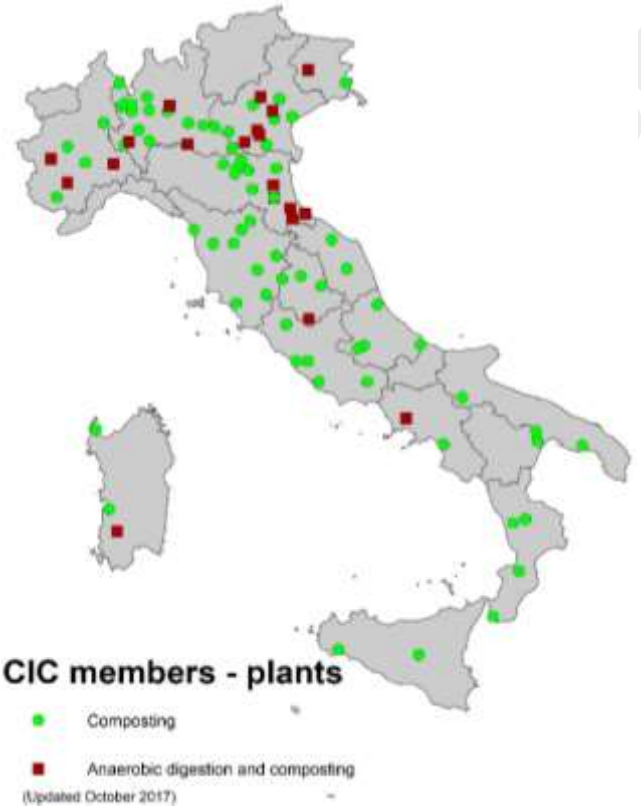
[7] COMIECO (the Italian National Consortium for Recovery and Recycling of Cellulose Packaging) represents the Italian compulsory EPR scheme for recycling packaging waste and graphic paper collected separately by Italian Municipalities.

Facilities of CIC Ordinary Members

Facility (name)	CIC QC Label	Town	Region	Treatment capacity tpa
A2A AMBIENTE SPA		Corteolona	Lombardy	38.000
A2A AMBIENTE SPA	X	Lacchiarella	Lombardy	15.000
ACEA AMBIENTE SRL		Aprilia	Lazio	66.000
ACEA PINEROLESE INDUSTRIALE SPA	X	Pinerolo	Piedmont	90.000
ACIAM SPA	X	Aielli	Abruzzo	25.000
AGRIENERGIA SPA		San Pietro in Casale	Emilia Romagna	33.700
AGRILUX SRL		Lozzo Atesino	Veneto	73000
AGROFERT SRL		Isola della Scala	Veneto	35.000
AIMAG SPA		Carpi - loc. Fossoli	Emilia Romagna	75.000
AIMAG SPA		Finale Emilia	Emilia Romagna	40.000
AISA IMPIANTI SPA	X	Arezzo	Tuscany	20.000
ALIA SERVIZI AMBIENTALI SPA	X	Borgo S. Lorenzo	Tuscany	35.000
ALIA SERVIZI AMBIENTALI SPA	X	Montespertoli	Tuscany	180.000
ALIA SERVIZI AMBIENTALI SPA		Sesto Fiornetino	Tuscany	86.000
ASECO SPA	X	Ginosa	Apulia	80.000
AZIENDA AGRICOLA ALLEVI SRL	X	Ferrera Erbognone	Lombardy	59.000
AZ. CUNEESE SMALTIM. RIFIUTI SPA	X	Borgo S. Dalmazzo	Piedmont	35.000
AZ. MULTISERV. IGIENE AMB. SPA		Borgotaro Torinese	Piedmont	-
AZ. MUNICIPALE AMBIENTE SPA ROMA	X	Roma	Lazio	29.000
BERTUZZO SRL	X	Montecchio Precalcino	Veneto	14.000
BIOCICLO SRL	X	Castiglione di Stiviere	Lombardy	45.640
BIOFACTORY SPA	X	Calcinate	Lombardy	80.000
BIOFLORA SAS SOCIETA' AGRICOLA		Dorno	Lombardy	
BIOGARDA SRL		Valeggio sul Mincio	Veneto	28.000
BIOLAND SRL		Casal Cermelli	Piedmont	126.000
BIOMAN SPA	X	Maniago	Friuli V.G.	200.000
BIWIND	X	Deliceto	Apulia	10.950
CALABRA MACERI E SERVIZI SPA	X	Rende	Calabria	43.000
CIR33 SERVIZI SRL		Corinaldo	Marche	25.000
COMPOSTAGGIO CREMONESE SRL		Sospiro	Lombardy	38.040
CONSORZIO ENERGIE ALTERNATIVE		Caivano	Campania	33.000
CONS. IND. PROV. ORISTANESE	X	Arborea	Sardinia	24.000
CONS. INTERCOMUNALE C.I.V.E.T.A.	X	Cupello	Abruzzo	24.000
CON.S.AMB. S.C.A.R.L.	X	Notaresco	Abruzzo	50.000
CONTARINA SPA		Trevignano	Veneto	35.000
COSMARI SRL		Tolentino	Marche	53.700
COOPERATIVA SOCIALE LA CITTÀ VERDE		Crevalcore	Emilia Romagna	15.000
E. GIOVI SRL		Fiumicino	Lazio	30.000
ECOCALL SPA	X	Vazzano	Calabria	30.000
ECO COMPOST MARSICA SRL	X	Avezzano	Abruzzo	15.000
ECOLOGIA E AMBIENTE SPA		Enna	Sicily	10.967
ECO SERVICE SRL		Motta San Giovanni	Calabria	22.500
ECOLOGIA VITERBO SRL		Viterbo	Lazio	-
ECOPROGETTO VENEZIA SPA		Venezia	Veneto	-
EDEN '94 SRL		Manduria	Apulia	60.000

Facility (name)	CIC QC Label	Town	Region	Treatment capacity tpa
ENOMONDO SRL	X	Faenza	Emilia Romagna	62.000
E.R.U.S. SERVICE SPA	X	Origgio	Lombardy	20.000
ETRA SPA	X	Bassano del Grappa	Veneto	44.300
ETRA SPA		Camposampiero	Veneto	53.500
ETRA SPA		Vigonza	Veneto	34.000
FERTITALIA SRL		Villa Bartolomea	Veneto	36.000
FERTITALIA SRL		Villa Bartolomea	Veneto	113.000
FUTURA SPA	X	Grosseto	Tuscany	33.014
G.A.I.A SPA	X	San Damiano d'Asti	Piedmont	24.600
GEOFOR SPA		Pontedera	Tuscany	21.000
GESENU SPA		Perugia	Umbria	105.000
GreenASM SRL		Narni	Umbria	43.500
GTM SPA		Ghisalba	Lombardy	105.000
HERAMBIENTE SPA	X	Cesena	Emilia Romagna	50.000
HERAMBIENTE SPA	X	Lugo	Emilia Romagna	60.000
HERAMBIENTE SPA	X	Ostellato	Emilia Romagna	28.000
HERAMBIENTE SPA	X	Ozzano	Emilia Romagna	28.000
HERAMBIENTE SPA	X	Rimini	Emilia Romagna	57.000
HERAMBIENTE SPA	X	Sant'Agata Bolognese	Emilia Romagna	60.000
ISONTINA AMBIENTE SRL	X	Moraro	Friuli V.G.	18.000
KOSTER SRL	X	Gallarate	Lombardy	26.000
KOSTER SRL		San Nazzaro Sesia	Piedmont	83.400
LADURNER SPA		Albairate	Lombardy	70.000
LADURNER SPA		Eboli	Campania	20.000
LADURNER SPA		Tortona	Piedmont	42.000
MANTOVA AMBIENTE SRL	X	Pieve di Coriano	Lombardy	20.240
MASERATI SRL		Sarmato	Emilia Romagna	50.000
MI.GA. SRL		Celico	Calabria	45.000
MONTELLO SPA	X	Montello	Lombardy	342.000
NUOVA AMIT SRL	X	Rovigo	Veneto	40000
PROGEVA SRL	X	Laterza	Apulia	45.000
S. CARLO SRL		Fossano	Piedmont	68.000
SEA RISORSE SPA	X	Viareggio	Tuscany	25.200
SECIT SPA			Lazio	-
SELF GARDEN SRL	X	Aprilia	Lazio	45.000
SESA SPA	X	Este	Veneto	445.000
SICILFERT SRL		Castelvetrano	Sicily	7.500
SIENA AMBIENTE SPA	X	Abbadia S.Salvatore	Tuscany	13.000
SIENA AMBIENTE SPA	X	Asciano	Tuscany	25.000
SILEA SPA		Annone Brianza	Lombardy	28.000
SNUA SRL		Aviano	Friuli V.G.	2.999
SNUA SRL		Aviano	Friuli V.G.	156.500
SOCIETA' AMBIENTE FROSINONE SPA		Colfelice	Lazio	35.000
SOGLIANO AMBIENTE SPA	X	Sogliano al Rubicone	Emilia Romagna	40.000
SYSTEMA AMBIENTE SPA		Bagnolo Mella	Lombardy	37.400
TECNOGARDEN SERVICE SRL		Città Ducale	Lazio	13.000
TECNOGARDEN SERVICE SRL	X	Castel Seprio	Lombardy	11.150
TECNOGARDEN SERVICE SRL	X	Luino	Lombardy	10.000
TECNOGARDEN SERVICE SRL	X	Vimercate	Lombardy	28.500

Facility (name)	CIC QC Label	Town	Region	Treatment capacity tpa
TECNOGARDEN SERVICE SRL	X	Roma	Lazio	30.000
TRASIMENO SRL		Castiglione del Lago	Umbria	22.000
VALLE UMBRA SERVIZI SPA	X	Foligno	Umbria	55.000
VERDEAMBIENTE SRL		Cirimido	Lombardy	90.000
VERDE VITA SRL	X	Porto Torres	Sardinia	15.000
VILLASERVICE SPA	X	Villacidro	Sardinia	51.300



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Thanks to: