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21st Report
Collection, Recycling, and Recovery of Paper and Board in 2015
July 2016

comieco
Consorzio Nazionale Recupero e Riciclo degli Imballaggi a base Cellulosica

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Welcome to the 21st Report on the "Collection, Recycling, and Recovery of paper and board."

In this edition, data analysis is organized in three areas – identified by different colours:

- Data on national collection, recovery, and recycling (orange)
- Data on the collection, recovery, and recycling managed by Comieco (pink)
- Scenario (red)

Some charts and tables are supplemented with hypertext links with QR Code, introducing to more detailed contents that may be accessed using a smartphone.

Basic information is contained in a brief insert that can be detached from the cover for quick and convenient use.

Thank-you for your attention and enjoy your reading.

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Preface

Ignazio Capuano
Chairman, Comieco

Like paper, ideas are always welcome, useful, practical, adjustable, and recyclable. For hundreds of years Italy – which certainly does not enjoy an abundance of raw materials – has been focusing on the production of high-quality ideas. Some of these concern paper and, particularly, the organization in charge of used paper recovery and recycling.
In 1985, the idea of a group of companies to set up a Committee for environment-friendly packaging (Comieco) gave life to something that was soon bound to become a true Circular Economy, the same that sees paper and board recycling operators play a well-defined role today: citizens separate paper at home; this is collected by Municipal operators, sorted by the relevant plants, and recycled by paper mills to produce new paper; paper industries manufacture new paper and board packaging and products that return to the citizens' homes via the distribution system.

Was that a good idea? So it seems, considering that collection increased three-fold over a few years in our Country, from one to three million tons per year, thus achieving the targets set by the EURpean rules three years in advance.

While a review of results for the Country's macro-areas still highlights some improvement margins, regions in the North and Centre display a top-level performance in EURpe today. Broad improvement margins historically exist in some regions, and new ideas are required to ensure that all the "paper resources" that can be recovered are actually recovered: the South is indeed a gold mine in this respect. This is why the implemented ideas include the ANCI-Comieco Tender and the Plan for the South.

In 2016 Comieco renewed once again its commitment to support small and medium cities with collection deficits by providing funds to buy equipment and communication services, as provided for by the ANCI-Comieco Tender. After the positive experience of 2014 and 2015, which involved a total of 1.6 million inhabitants with an investment of just more than 3 million EUR, a qualitative target was introduced in 2016 for each funded City. More than 100 applications were received, for a base of 2 million inhabitants and loans for 3.7 million EUR.

With the Plan for the South sponsored by the Ministry of the Environment and of Land and Sea Protection, Comieco allocated extraordinary funds for up to 7 million EUR to pay for the purchase of equipment and vehicles in the southern Cities covered by the agreements. Comieco shall provide all the necessary funds subject to validation of the submitted projects, and shall bear a maximum 50% share of the cost of the equipment and vehicles based on the collection targets achieved within a specified term. As an additional guarantee for the successful operation of the plan, each investment shall be subject to regular communication and data sharing activities.
Both initiatives have the same goal – intercept as much paper as possible and increase the amount and quality of paper and board collected separately.

Once separating paper and board at home becomes a positive habit, citizens hardly give it up, because something that may have felt like an effort at first has now developed into a natural daily activity, a real indicator of community spirit, as well as because there is always a real and effective happy end: recycling is ensured by Comieco! However, experience shows that the citizens' awareness and interest must be constantly stimulated to maintain the positive results achieved and to improve them where it is most needed. In order to develop and establish a habit, we need to know what the stakes are and acknowledge the real value of paper as a "final" renewable, valuable asset that needs to be recovered.
There is no end to the cycle of paper and board: where a box's life ends, another one's starts.

Carlo Montalbetti
General Manager, Comieco

Separate paper and board collection in Italy – The state of the art

1. 2015 - Mature Growth

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An analysis of paper and board collection, recovery, and recycling in Italy in the past 21 years highlighted a gradual increase of both the quality and quantity of paper for recycling originating from municipal collection, as well as of paper and board recovery and recycling rates.

Per-capita yields grew from 17 kg/ab-year in 1998 to **51.5 kg/ab-year** last year. At the same time, the recycling rate of consumed paper and board packaging grew from 37.0% to **79.7%**. Improvement margins are shrinking; increases that may seem to be limited to few percent points call, instead, for more and more significant investments and efforts. This is why the **0.5%** increase of separate paper and board collection recorded in 2015 should be considered as a positive result. In absolute terms, collection totals more than 3.1 million tons – over 20thousand tons up compared to last year.

However, the overall national data can and should be broken down to reveal the key information required to design strategies aimed at consolidating, recovering, or promoting wherever it is most

needed. For example, it turns out that the recorded increase is the result of uneven trends across the country, and areas can be clearly identified where actions and resources are most needed to improve collection performance significantly.
The South of the Country requires the greatest efforts, because it provides the greatest margins for growth. In this respect, focused development strategies were designed and implemented in the past few years. In particular, several important activities were carried out to support collection, and early results are coming.

2. Double Standards for the Italyns

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Even more caution is required in data analysis to assess the weight of the individual regions, which depends on a variety of key factors - such as lifestyles, economic standards, service organization, baseline conditions, local rules, existence of private operators - as well as on the population. A 6thousand ton decline in a reference region like Lombardy (-1,2%) points out to sensitivity towards economic factors that point out, in turn, to a general decrease of waste production. The same 6thousand ton growth in Sicily (+8.6%) is rather the result of service improvements in a region where the qualitative and quantitative growth margin of collection is still large.
The essence of separate paper and board collection may be effectively explained with an analogy: it is like climbing a Himalayan peak - above a given altitude, new progress becomes more difficult, steps get shorter and, if we want to move forward, we need to figure out and test new and different progression techniques.
Throughout 2015, in fact, the **North** lost 0.7% compared to the previous year, with a significant decline recorded in **Veneto** (**-3.4%**) and **Piedmont** (**-3.3%**) that the positive performance of **Liguria** (**+6.3%**), **Emilia Romegna** (**+3.7%**) and **Vallée d'Aoste** (**+3.8%**) can hardly offset. The **Centre** is substantially stable: whatever is lost by **Tuscany** (**-2.6%**) is offset by **Latium** (**+2.7%**), while the South records a positive result (**+4.1%**). In this macro-area, all the regions, with the sole exception of **Molise** (**-6.4%**), record significant improvements, with as much as **+8.6%** in **Sicily** that, however, ranks last in an imaginary list of collection levels.
Data for the South is, therefore, encouraging and confirms a revival which has been under way in the past three years, after suffering some troubles in 2010 and 2013, albeit still far from ranking as good or excellent. A detailed analysis of per-capita separate paper and board collection still highlights a wide gap that does not seem to be justified by macro-economic differences and should rather be attributed to the status of services. While data for the North and Centre is aligned (**62.0 and 62.4 kg/ab-year**), the South does lastly exceed the symbolic 30 kg/ab-year threshold, but collects less than half the amounts of the North and Centre. This average is the result of extreme variability, from the excellent performance of **Abruzzo** (**52.3 kg/ab-year**) to a mere **16.5 kg/ab-year** for **Sicily**.
The increase in the South was expected and hoped for. The goal of the **Plan for the South**, with loans for 7 million EUR in 2015, was – in fact – to support paper and board collection growth in the region.
The decline in the **North** (also including Tuscany) originates, on the other hand, not so much from a reduced effort of the stakeholders (citizens, companies, administrations), as from consumption stagnation. This adds up to the impact of a significant replacement brought about by IT technologies in the publishing and data storage sector. In particular, the production of graphic paper declined by 20% in the past decade (from 3.4 million tons in 2006 to 2.7 tons in 2015), as also confirmed by the press circulation data, which shows that the mean monthly circulation of newspapers has substantially halved.
In this dual scenario, some regions stand out for a significant performance. Citizens in **Emilia-Romegna** collect **84,9 kg/ab-year** of paper every year – the best national result. **Tuscany** stands out in the Centre, with **69,5 kg/ab-year**, while the best performance among the Southern regions is recorded for **Abruzzo**, which perfectly rep-

resents the national average with **52,3 kg/ab-year**.
An alternative viewpoint derives from an analysis (the data base is not homogeneous) that does not just focus on separate paper and board collection, but enters its value into a broader picture that also compares the mixed waste amounts produced and the prevalence of the cellulose fraction. The result is an interesting overview, also functional to decide where resources should be aimed to achieve short and medium-term results. Sicily and Latium rank first in this respect in that, with over 11 million inhabitants, they account for almost 20% of the country's population.

3. What Happens in Town

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Big cities provide an excellent observation point over the trend of collection. Some of the main Italyn Cities – **Turin**, **Milan**, **Florence**, **Rome**, **Naples**, **Palermo** – have been monitored for a few years. This year **Bari** is also included, being a reference point among the big Southern cities for its excellent separate paper and board collection results.
Overall urban waste production data points out to a minor decline (-0,9%) and confirms a trend that has been under way for a few years. Inner dynamics are stronger, instead, with the establishment of separate collections (+6,8%) that significantly erode the hard core of waste as such (-5,2%). Almost 100thousand tons of materials have changed their destination, moving from landfills to recovery plants. This result is confirmed in six cities out of seven, albeit at different rates. The only exception is **Palermo**, where separate collections as a whole made little progress due to the critical conditions of collection services.
Separate paper and board collection is substantially stable, albeit with a few differences among metropolitan areas: it declines in **Milan**, **Turin**, and **Florence**, but increases in **Naples** and, particularly, in **Rome**. **Rome** confirms a positive trend with an 8% increase of separate collection vs. total collection. **Turin** produces less paper (-27% in 10 years), but less waste too (-7% in the same period).
The share of separate paper and board collection vs. separate collection in the cities in 2015 was 28.4% on average, vs. 47.8% in 2004. What does it mean? Does it mean that paper collection has declined? Not at all: the amount of paper for recycling collected in the same period increased by over 62thousand tons on average, i.e. 15%. The share of separate paper and board collection is rather reduced by a positive factor, i.e. the progress made by other separate collections, which increased more than three-fold from 2004 to 2015 (+202%)! This trend is expected to continue in the next few years, with the gradual prevalence of the organic fraction vs. all the others and the downsizing – in percent, but not in absolute terms – of the role of the cellulose fraction towards a physiological rate in urban waste.
It should be noted, however, that separate collection of the organic fraction deriving from separate urban waste collection (known by the Italyn acronym FORSU) has been traditionally characterized by the presence of cellulose-based materials, which can be effectively recovered by the industrial composting and biogas production plants. A recent qualitative and quantitative survey carried out by Consorzio

Italyno Compostatori – CIC (the Italyn Consortium of composting plants) showed that the total share of cellulose-based materials varies from 2.4% to 3.4%.

4. Packaging Management

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The lifecycle of cellulose-based packaging is a perfect example of Circular Economy from the moment it enters citizen homes to the moment it returns thereto after being separated, sorted, recycled, processed, and reintroduced via the distribution system.
Throughout 2015, the apparent consumption of packaging totalled more than 4.5 million tons. While the recycling rate is set at **79.7%**, total recovery amounts to **88.7%** including the energy recovery share. All indexes change to the positive compared to 2014.
It should be noted that data collected before 2014 cyeart be directly compared with later data, because apparent consumption data before 1/1/2014 did not include the so called "cores", i.e. the board or cardboard tubes or rolls supporting paper for professional, cooking, or hygienic-sanitary use. This specification is functional to proper understanding of results, which would otherwise be interpreted as a negative trend. On the other hand they point out to an increase and are largely above the targets set by the Consolidated Environmental Law that, in turn, implements EU directives.
A recent study requested by Conai highlighted that paper and board packaging recycling managed by the consortium under the agreements generates direct and indirect benefits for over 88 million EUR. The value of both the produced raw materials and the avoided CO2 emissions is included in this figure.

Comieco management - figures and results for 2015

5. Collection under the Agreements

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In 2015, **794** agreements were in force with Comieco; **5,459** Cities out of 8,111 (**67,3%**) and **49 million inhabitants** out of 60 million – equal to **81%** of the Italyn population – were covered by the guarantee of recycling through the recycling network connected with Comieco.
In the **North**, 148 agreements covered 78.2% of the inhabitants. Each agreement in the North involved 145thousand resident citizens on average. In the **Centre**, 106 contracts were in force, covering 87% of the inhabitants, i.e. 97,500 inhabitants each, whereas in the **South** 540 agreements were in force, each covering 32thousand inhabitants on average. In 2015, total collection under the Comieco agreements was just below one and a half million tons, i.e. **47%** of the whole Italyn municipal collection.
Two points are worth stressing here. First, a non-homogeneous organization of the agreements. Over 68% of contracts are open in the South, often signed with individual Cities for very small numbers of citizens and managed amounts. This poses a challenge for the management and development of collections, in that it does not allow to optimize investments and improve the performance. Another key factor is the subsidiarity of Comieco with respect to the market. The Consortium, in fact, operates as a party requested by the Cities and operators to ensure the recycling of such a share of materials as is needed to maximize revenues and optimize management. A significant share of the collected cellulose-based materials, totalling **1.65 million tons**, is recycled without the involvement of Comieco. These materials have a double origin: they partly come from collections in Cities that are not covered by the agreements and partly from Cities under the Comieco agreements that, however, allocate a share (usually non-packaging urban waste) to operators other than Comieco. Additional amounts, for about 3 million tons of paper and board, are collected outside the operating scope of the Cities (special waste).

6. Economic Support

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In **2015**, the Cities under the agreements received considerations for **almost 100 million EUR** (98.5), **4% up** compared to 2014, despite a minor decline of the managed amounts (-11thousand tons). This is the effect of the full operation of the new Gen-

eral Agreement between ANCI and CONAI (2014-2019 period) – almost 100 million EUR that help pay the higher costs connected with separate paper and board collection.
In addition to the amount of this contribution, the certainty of payment terms for the packaging fraction is worth mentioning as an additional guarantee for the Cities subject to the agreements with Comieco.
Within the framework of the new Agreement, processing contracts come into force, providing for an integration of the agreement (contracts - for secondary raw materials – aimed at integrated parties) with reference to sorting and crushing in plants for transformation into paper for recycling. In 2015 Comieco allocated an additional 10 million EUR for the enforcement of these contracts.

7. ANCI -Comieco Tender for the South - A Renewed Effort

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Repeating the positive experience made with the first **ANCI-Comieco Tender**, called for the first time ever in **2014** for the purpose of promoting separate paper and board collection in small-medium cities with a collection yield below 22 kg/ab-year, in **2015** Comieco launched a new tender with 2 million EUR funds. The purpose of this allocation is the same – help small administrations, particularly in the South, pay for the necessary equipment to improve separate collection.
Leveraging on prior experience, the threshold for access to the 2015 tender was raised to 27 kg/ab-year to allow a higher number of administrations under the agreements to participate. The funds were fully allocated to projects involving 101 Cities. The allocations were used to pay for the purchase of equipment (dumpsters, bells, bins, bags, etc.) and to complete interventions supported by communication activities.
A new ANCI-Comieco Tender was launched for **2016**, with 3.4 million EUR funds fully allocated to projects with specific improvement targets.

8. Focus on Quality

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While the ANCI-Comieco Technical Annex on Paper confirmed the first quality bracket standards for 1.01+1.02 (foreign fractions up to 3%) and 1.04+1.05 (foreign fractions up to 1.5%), it provided a more detailed definition of the test planning and performance procedures.
Almost **1,100** samples were collected in 2015 upon unloading at the sorting plant using the operational mode. The results point out to an increase of the average foreign fraction value compared to 2014 for both collection channels. While on average 1.04+1.05 generally complies with the standards (**0.87%** of foreign fractions), the average result for 1.01+1.02 is close to the threshold of bracket one (**3.00%** of foreign fractions). The analysis of disaggregated data shows that medium-small entities generally contribute to the critical trend observed, whereas the result referred to the sample of larger Cities (80% of the managed amounts as from the annual plan) points out to higher quality.

9. Comieco - The National Recycling Network

▸ FIGURE 8
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The materials obtained from the collection managed by Comieco are delivered, across the national territory, to over 300 sorting plants for processing. This widespread network allows to limit costs while ensuring vehicle unloading within a short distance from the collection points (**17.3 km** on average).

After processing, the collected paper and board are available for production. Sixty percent (just less than 600thousand tons) of the amount managed by Comieco is entrusted pro quota to **56** plants (paper mills) that ensure recycling throughout the national territory. The other 40% (approximately 58thousand tons) is awarded by means of regular auctions – according to the commitments taken by Comieco vs. AGCM and enforced as of 2011 – to parties whose operating capacity is such as to ensure recycling. In 2015, **24** parties were awarded at least one lot; 95% of this material was recycled in Italyn plants.

The Overall Scenario of the "Country System"

10. Guidance from the Paper Sector

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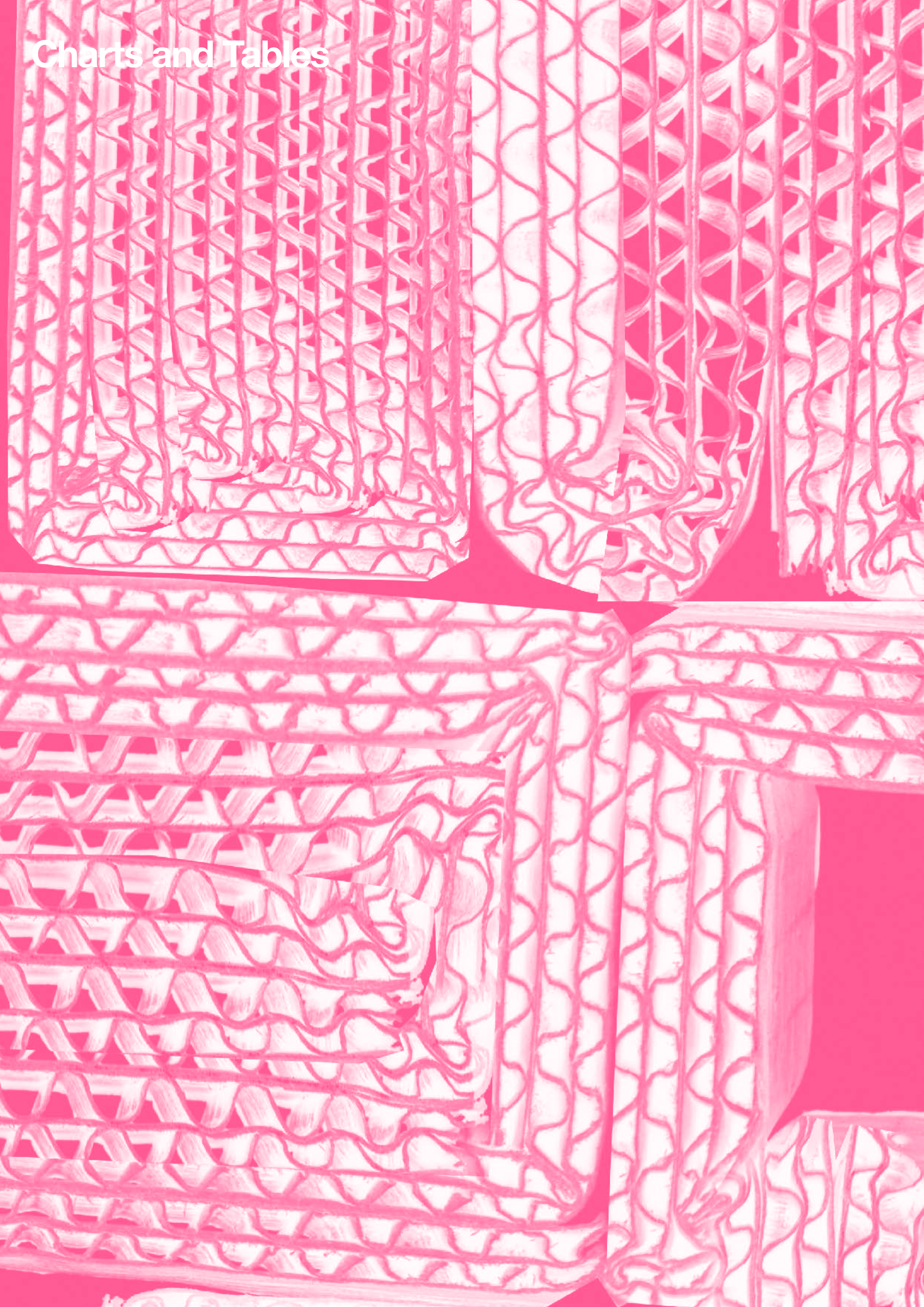
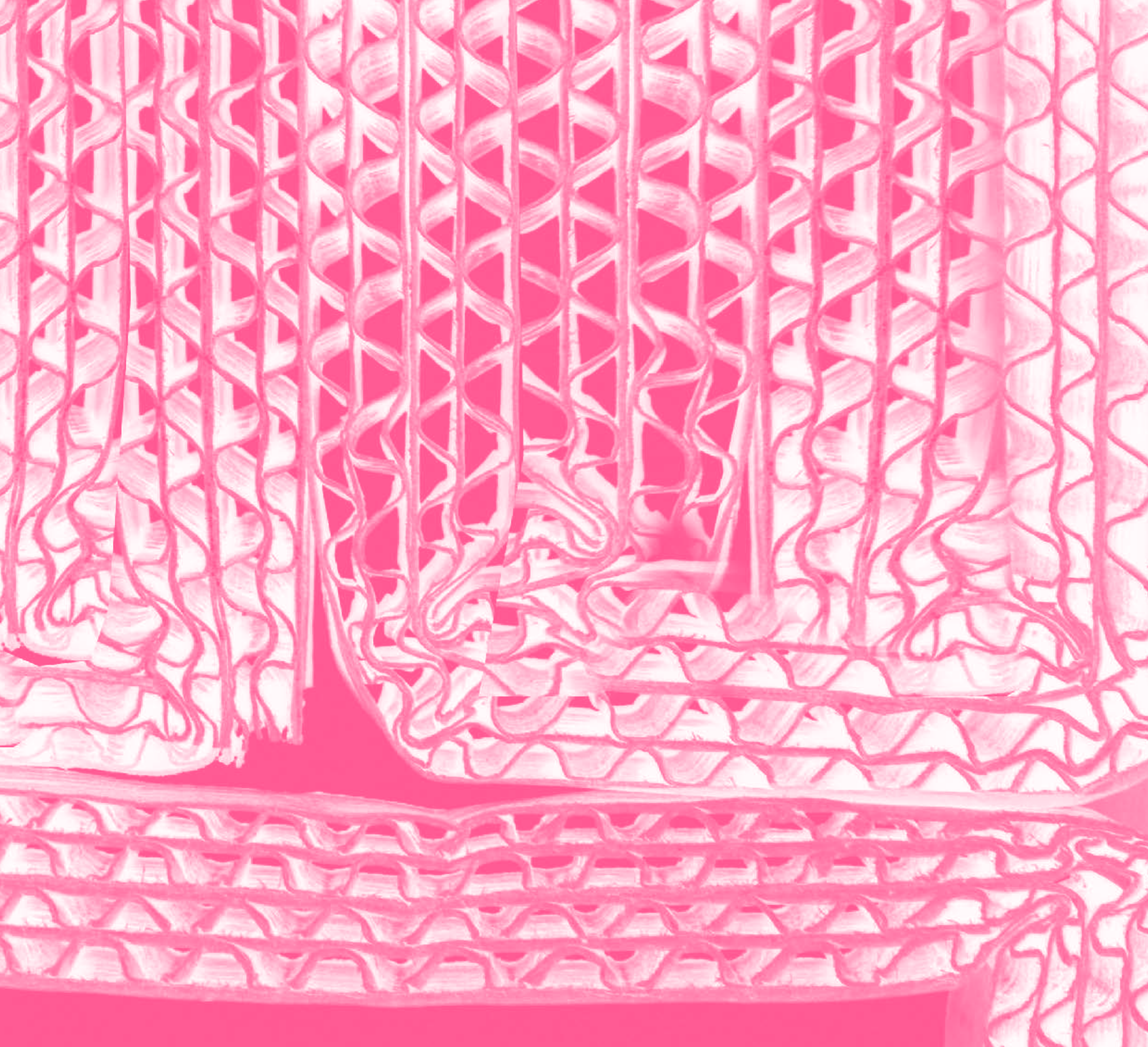
Expanding the analysis to include the broader paper sector provides interesting information.
What first stands out, compared to 2014, is **revamped production** (**+2.1%**) in the cellulose-based materials segment, particularly for packaging and paper for hygienic-sanitary use, whereas production is declining for the graphic paper segment. This is also confirmed by data on the apparent consumption of paper for recycling – while growing, it shows a gap between the packaging segment and the graphic paper segment, which sees the latter decline to a 53% ratio vs. packaging. This is a key fact that points out to the drastic change of the amount of the cellulose fraction in mixed waste, including in urban waste, and was used as the basis for development of the new Technical Annex on Paper.
At the same time **apparent collection** levels are growing (**+4.6%**), driven by exports (+144thousand tons). Export amounts are headed to the Far East (69%), and the remaining share (just more than 30%) to EURpean countries.
Apparent collection (consumption + export – import) grew by 281thousand tons, which largely (93%) passed through the collection circuits of special waste.
In this context, the price of paper for recycling slightly increased (5 to 10%) compared to 2014, and stability is recorded in the early months of 2016.

Charts and Tables





Acronyms

CTA Comieco Technical Annex
FMS Frazioni Merceologiche Similari(similar product fractions) (non-packaging paper and board)
SC Separate Collection
UW Urban Waste
% percent rate
n number
t tons
kt .000 tons
ab inhabitants
kg kilograms

Table 1

Trend of municipal separate paper and board collection by regions.
Years 2014-2015

Source: Comieco

Region	SC of Paper 2014	SC of Paper 2015	Δ 2014-2015	Δ 2014-2015
	t	t	t	%
Piedmont	273,262	264,298	-8,964	-3.3
Vallé d'Aoste	9,336	9,696	359	3.8
Lombardy	530,041	523,897	-6,144	-1.2
Trentino a,A,	82,094	80,595	-1,499	-1.8
Veneto	293,582	283,495	-10,087	-3.4
Friuli v,G,	74,056	70,073	-3,983	-5.4
Liguria	91,158	96,932	5,775	6.3
Emilia Romegna	359,227	372,487	13,260	3.7
North	**1,712,756**	**1,701,473**	**-11,283**	**-0.7**
Tuscany	267,782	260,734	-7,048	-2.6
Umbria	55,210	54,790	-420	-0.8
Marche	104,219	104,767	548	0.5
Latium	315,062	323,606	8,544	2.7
Centre	**742,274**	**743,898**	**1,624**	**0.2**
Abruzzo	67,990	69,799	1,810	2.7
Molise	6,565	6,142	-423	-6.4
Campania	202,638	209,552	6,914	3.4
Puglia	137,250	141,404	4,154	3.0
Basilicata	17,087	18,102	1,015	5.9
Calabria	50,949	54,132	3,183	6.2
Sicily	76,357	82,941	6,584	8.6
Sardinia	72,020	74,927	2,907	4.0
South	**630,855**	**656,998**	**26,143**	**4.1**
Italy	**3,085,885**	**3,102,369**	**16,484**	**0.5**

Note: 2014 data adjusted for Piedmont, Lombardy, Trentino A.A., Latium, Campania, and Sardinia

The South drives the increase of municipal separate paper and board collection for the whole country in 2015, with over 26thousand tons more.

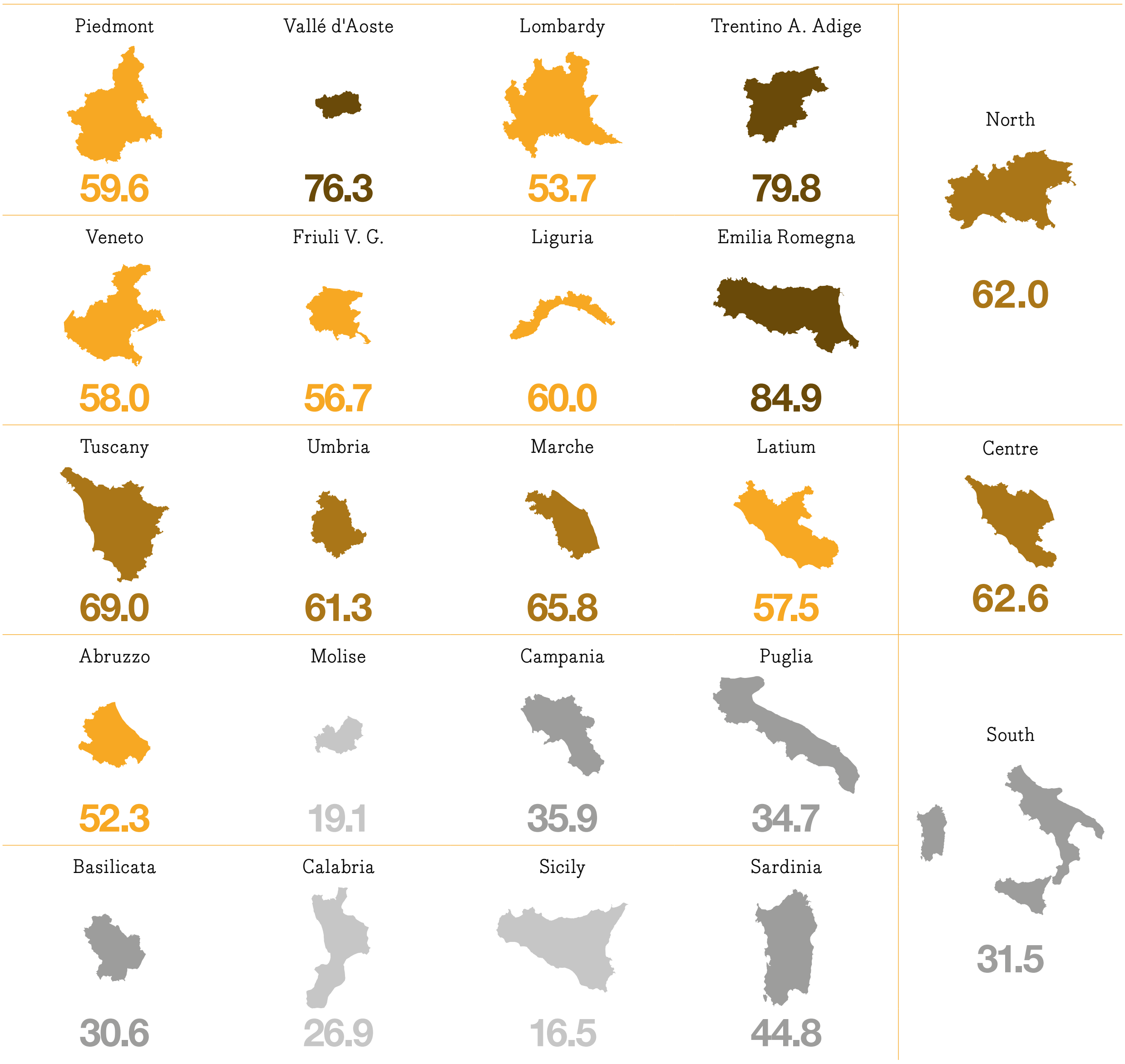
This offsets the decline recorded in the North, mostly due to a decrease of overall waste production

Figure 1

Per-capita municipal separate paper and board collection by regions and by areas.
Year 2015.

Source: Comieco estimate

- <30 kg/ab year
- 30-45 kg/ab year
- 45-60 kg/ab year
- 60-75 kg/ab year
- >75 kg/ab year



Each Italian citizen collected on average 51.5 kg of paper and board in 2015. The South passed the 30 kg/ab threshold. The performance of the past few years is confirmed for the North and the Centre. Emilia Romegna, Tuscany, and Abruzzo lead the respective macro-areas.

Table 2

The incidence of separate paper and board collection on total urban waste.
Year 2015.

Source: 2014 ISPRA data processed by Comieco and preliminary 2015 data from local observations

Region	Inhabitants	Total UW	Mixed UW	Total SC	Total SC	SC of paper	SC of paper vs. total UW
	n	kg/ab	kg/ab	kg/ab	%	kg/ab	%
Veneto	4.927.596	454,7	147,3	307,4	67,6	57,5	12,7
Trentino Alto Adige	1.055.934	469,2	154,8	314,3	67,0	76,3	16,3
Friuli Venezia Giulia *	1.227.122	470,3	169,2	301,1	64,0	57,1	12,1
Marche *	1.550.796	472,8	169,2	303,6	64,2	67,6	14,3
Lombardy *	10.002.615	457,2	192,8	264,4	57,8	52,4	11,5
Sardinia	1.663.286	435,9	204,9	231,0	53,0	45,0	10,3
North	**27.799.803**	**498,2**	**205,3**	**292,9**	**58,8**	**61,2**	**12,3**
Piedmont	4.424.467	463,5	211,9	251,5	54,3	59,7	12,9
Campania	5.861.529	436,8	229,0	207,8	47,6	35,8	8,2
Abruzzo	1.331.574	445,4	240,0	205,4	46,1	52,4	11,8
Basilicata	576.619	348,8	252,7	96,2	27,6	31,4	9,0
Italy	**60.795.612**	**485,9**	**255,6**	**230,3**	**47,4**	**51,0**	**10,5**
Emilia Romegna *	4.450.508	665,6	258,9	406,7	61,1	83,7	12,6
Umbria *	894.762	526,2	259,8	266,4	50,6	61,2	11,6
Tuscany *	3.752.654	599,9	285,7	314,1	52,4	69,5	11,6
South	**20.905.172**	**437,8**	**296,2**	**141,6**	**32,3**	**31,4**	**7,2**
Molise	313.348	386,5	300,4	86,1	22,3	19,6	5,1
Centre	**12.090.637**	**540,7**	**301,1**	**239,6**	**44,3**	**61,5**	**11,4**
Puglia *	4.090.105	440,1	303,6	136,5	31,0	34,6	7,9
Vallé d'Aoste	128.298	564,6	322,4	242,1	42,9	75,6	13,4
Calabria	1.976.631	409,8	333,6	76,2	18,6	27,4	6,7
Liguria *	1.583.263	555,7	348,5	207,1	37,3	61,2	11,0
Latium	5.892.425	523,1	351,9	171,2	32,7	54,9	10,5
Sicily	5.092.080	460,0	402,4	57,5	12,5	16,3	3,5

*2015 updated data if available, 2014 ISPRA data for other regions

**Per-capita collection data should be included in a more articulate analysis measuring the incidence of cellulose-based waste and the overall performance of separate collection.
In this ranking, the regions are arranged by mixed urban waste in increasing order.**

Table 3

Collection quality (mean trend of foreign fractions). 2014-2015 comparison by macro-areas.

Source: Comieco

	Year 2014		Year 2015		Δ 2014-2015
	Tests n	Foreign Fraction %	Tests n	Foreign Fraction %	Foreign Fraction %
1.01+1.02					
North	231	2,12	227	2.23	0.11
Centre	130	2,66	150	3.58	0.92
South	363	2,84	252	3.35	0.51
Italy	**724**	**2,58**	**629**	**3.00**	**0.42**
1.04+1.05					
North	186	0,51	136	0.79	0.28
Centre	104	0,55	67	0.77	0.22
South	281	0,64	265	0.94	0.30
Italy	**571**	**0,58**	**468**	**0.87**	**0.29**

**Samples taken from the incoming materials at the plants show an increasing rate of foreign fractions compared to last year.
A focus on the larger entities (80% of the managed amounts as from the CTA plan) shows a reduced incidence of contaminating agents. The tests performed on smaller entities strongly affect the national average value.**

Table 4

Paper and board packaging recovery and recycling results achieved in 2015.

Source: Comieco

Recycling and recovery rate calculation	2015	Δ 2014/2015
	t	%
Apparent paper and board packaging consumption	4,584,651	3.7
Waste paper and board packaging (paper and packaging) from 1.01+1.02 recycled in Italy	351,676	-9.2
Waste paper and board packaging (packaging only) from 1.04+1.05 recycled in Italy	2,012,626	1.1
Paper for recycling obtained from waste packaging recycled abroad	1,288,757	16.7
Total recycled waste packaging	**3,653,059**	**4.9**
Paper and board packaging recovered as energy or waste-based fuel	**414,346**	**9.7**
Total recovered paper and board packaging	**4,067,405**	**5.4**

	%
Recycling	**79.7**
Energy recovery	**9.0**
Recovery	**88.7**

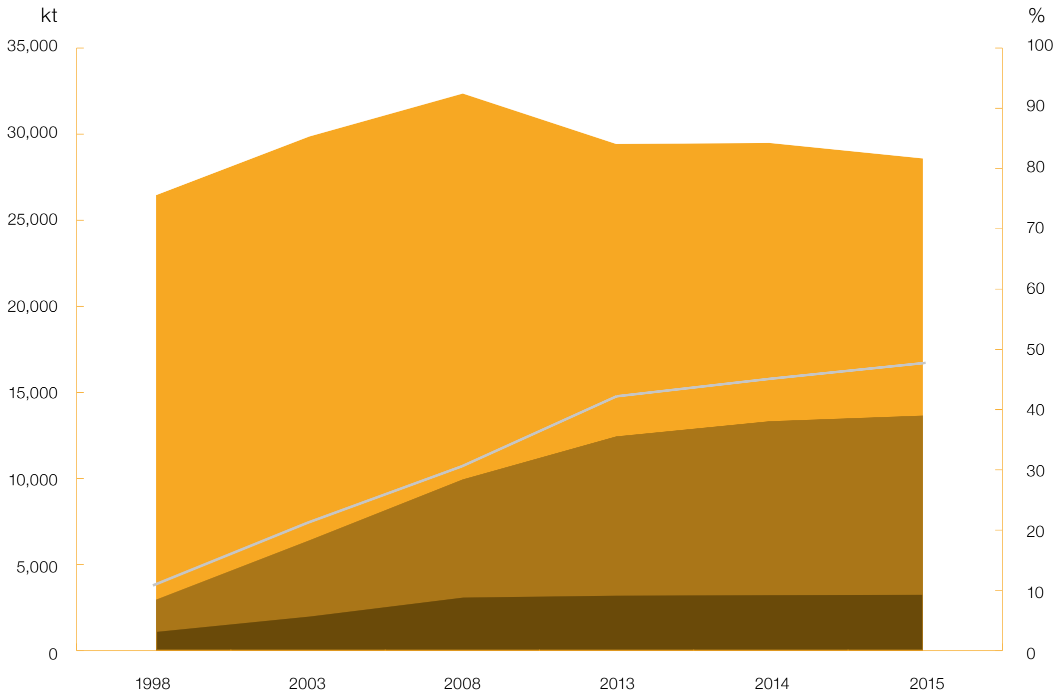
Note:
Apparent consumption data for 2013 was adjusted by CONAI, apparent consumption data for 2014 also includes tubes and rolls subject to the CAC (the CONAI environmental contribution) from 1/1/2014

Recycling and recovery rates are unchanged vs. the trend of the past few years. The paper and board packaging recycling target set by the rules has been achieved.

Figure 2

Comparison of urban waste production, total separate collection, and municipal separate paper and board collection in Italy. 1998-2015 historical data set.

Source: ISPRA and Comieco



Dettaglio procapite raccolta differenziata carta e cartone per area

	1998 kg/ab-year	2014 kg/ab-year	2015 kg/ab-year	Δ 2014/2015 kg/ab-year	Δ 1998/2015 kg/ab-year	Δ 1998/2015 %
North	28.3	62.4	62.0	-0.4	33.7	119
Centre	17.1	62.4	62.6	0.2	45.5	266
South	2.4	30.2	31.5	1.3	29.1	1,213
Italy	**17.0**	**51.2**	**51.5**	**0.3**	**34.5**	**203**

Total waste production declines in 2015 too (-3%). At the same time, separate collections increase (+2.5%).

The mean total national separate collection rate is close to 48% and paper accounts for over 22%

Figure
3

Waste collection in the sample cities Turin, Milan, Florence, Rome, Naples, Bari, and Palermo. 2004-2015 per-capita data.

Source: Comieco

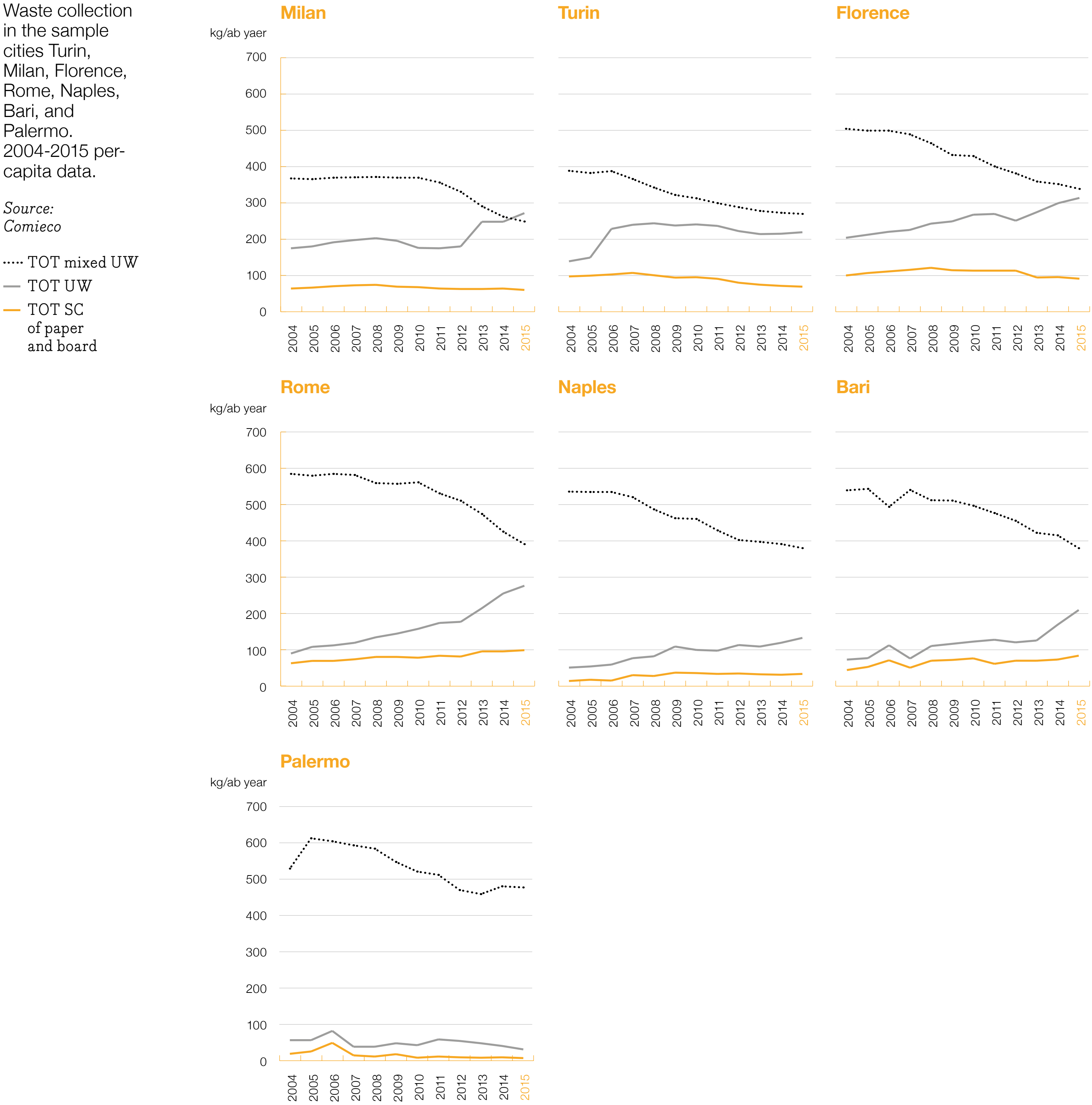
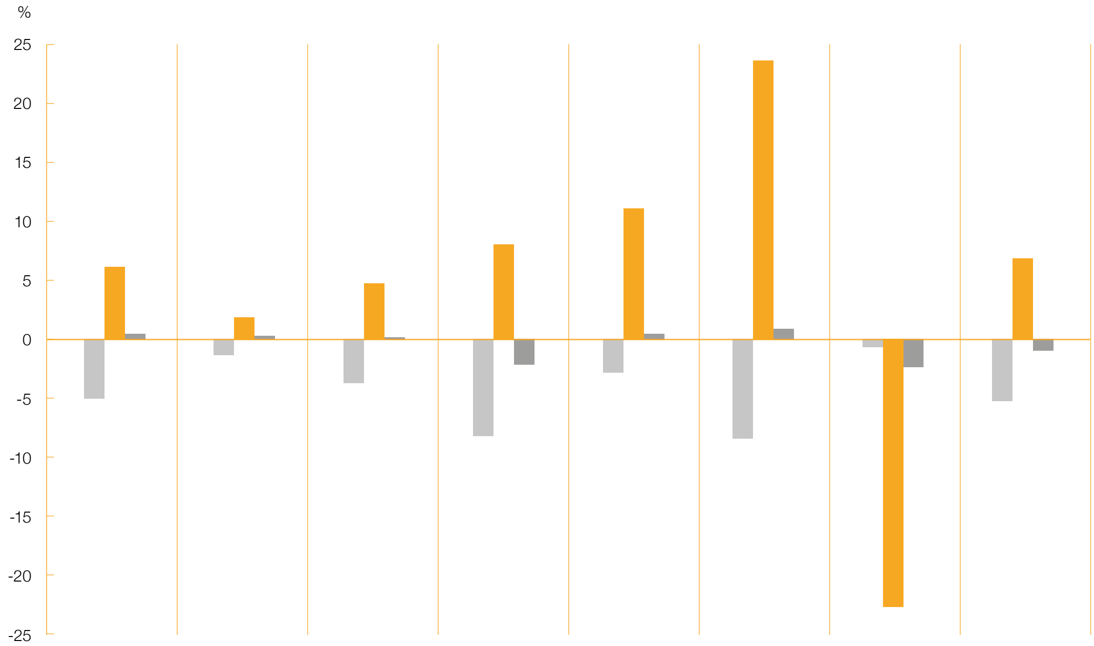


Figure 4

Waste collection in the sample cities Turin, Milan, Florence, Rome, Naples, Bari, and Palermo. 2014-2015 variations

Source: Comieco



		Milan	Turin	Florence	Rome	Naples	Bari	Palermo	Mean
Mixed UW	%	-5.0	-1.3	-3.7	-8.2	-2.8	-8.4	-0.6	-5.2
Total SC	%	6.1	1.8	4.7	8.0	11.1	23.7	-22.8	6.8
Total UW	%	0.4	0.2	0.1	-2.1	0.4	0.8	-2.3	-0.9

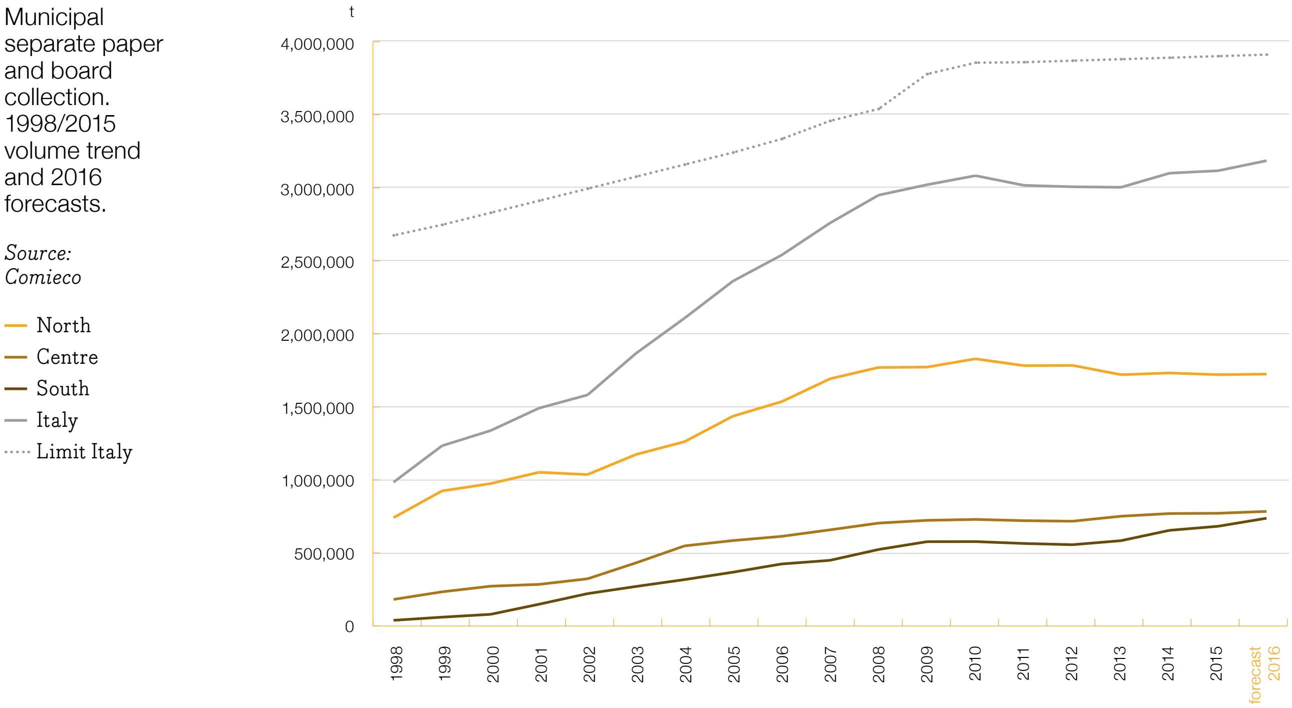
		Milan	Turin	Florence	Rome	Naples	Bari	Palermo	Total
Total separate collection	t	341,671	196,261	114,567	700,320	128,740	66,418	21,084	1,569,061
Total urban waste	t	668,157	440,025	239,290	1,700,768	503,848	188,893	337,257	4,078,238
Separate collection / Urban waste	%	51.1	44.6	47.9	41.2	25.6	35.2	6.3	-
Mixed urban waste	t	326,486	243,765	124,722	1,000,448	375,108	122,475	316,173	2,509,177

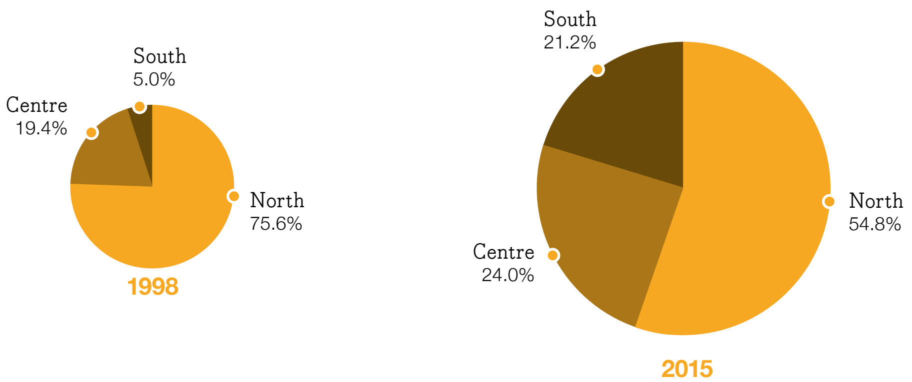
The focus on metropolitan cities confirms the national trend. Separate collections increase and, at the same time, overall waste production slightly declines.

Figure 5

Municipal separate paper and board collection. 1998/2015 volume trend and 2016 forecasts.

Source: Comieco





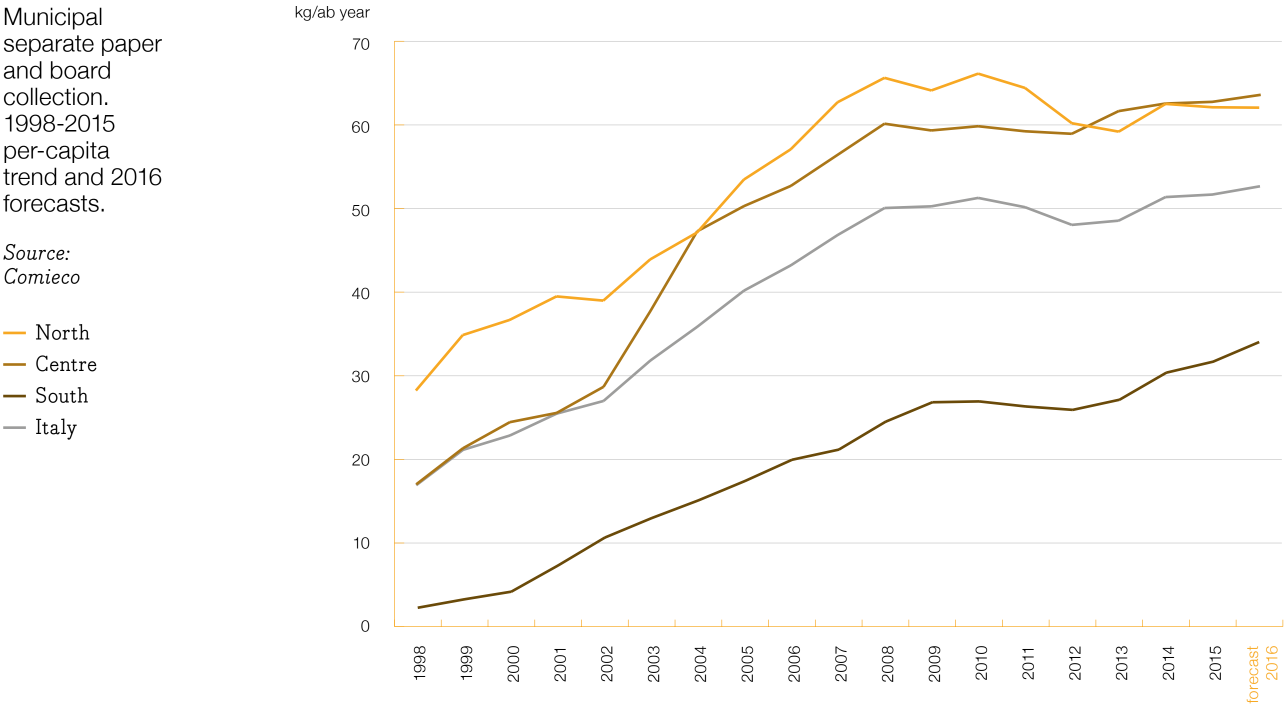
Nota: L'area delle torte è proporzionale ai volumi di raccolta.

		1998	2015	2016 forecast	Δ 2015-2016
North	t	756,813	1,701,473	1,705,356	3,883
Centre	t	193,958	743,898	755,820	11,922
South	t	50,222	656,998	708,873	51,874
Italy	t	**1,000,993**	**3,102,369**	**3,170,049**	**67,679**

Figure 6

Municipal separate paper and board collection. 1998-2015 per-capita trend and 2016 forecasts.

Source: Comieco

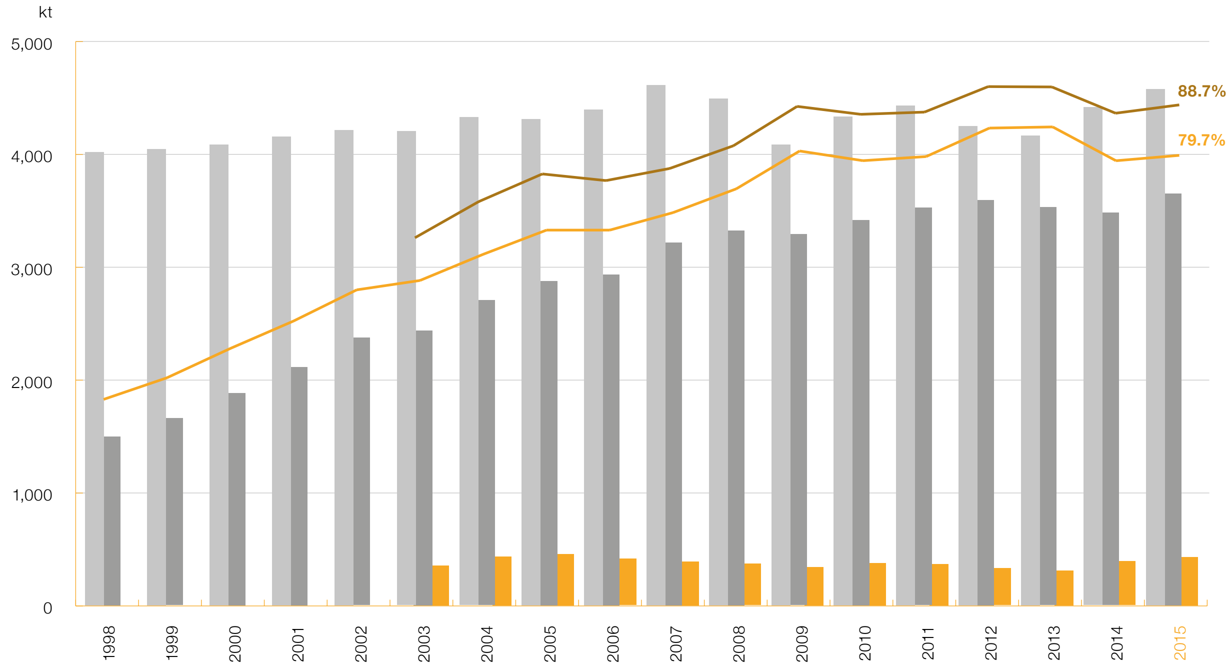


Significant growth margins still exist and are gradually covered by high-potential areas, such as the Southern regions.

Figure
7

Paper and board recovery and recycling targets achieved. 1998-2015 historical data set

Source: Comieco



- Apparent paper and board packaging consumption (t x 1000)
- Total waste paper and board packaging for recycling (t x 1000)
- Paper and board packaging recovered as energy or waste-based fuel (t x 1000)
- Recycling rate (%)
- Recovery rate (%)

Table 5

Local coverage by regions as at December 31, 2015.

Source: Comieco

Regions	Cities	Cities under the agreements		Inhabitants	Inhabitants under the agreements		Amount managed under the agreements	Amount managed under the agreements vs, SC of paper
	n	n	%	n	n	%	t	%
Piedmont	1,206	1,052	87.2	4,432,571	4,130,058	93.2	160,593	60.8
Vallé d'Aoste	74	74	100.0	127,065	127,065	100.0	8,915	91.9
Lombardy	1,549	606	39.1	9,750,644	5,424,738	55.6	178,645	34.1
Trentino Alto Adige	331	307	92.7	1,010,328	928,166	91.9	47,741	59.2
Veneto	582	432	74.2	4,888,887	4,069,758	83.2	102,238	36.1
Friuli Venezia Giulia	219	205	93.6	1,236,844	1,200,065	97.0	33,472	47.8
Liguria	235	117	49.8	1,615,064	1,310,771	81.2	29,678	30.6
Emilia Romegna	345	322	93.3	4,389,696	4,272,971	97.3	123,429	33.1
North	**4,541**	**3,115**	**68.6**	**27,451,099**	**21,463,592**	**78.2**	**684,711**	**40.2**
Tuscany	294	261	88.8	3,776,950	3,604,578	95.4	160,908	61.7
Umbria	92	52	56.5	894,222	762,015	85.2	13,871	25.3
Marche	248	200	80.6	1,591,969	1,376,129	86.4	46,748	44.6
Latium	378	158	41.8	5,626,710	4,597,915	81.7	78,194	24.2
Centre	**1,012**	**671**	**66.3**	**11,889,851**	**10,340,637**	**87.0**	**299,721**	**40.3**
Abruzzo	305	240	78.7	1,334,675	1,238,111	92.8	53,864	77.2
Molise	136	38	27.9	320,795	159,476	49.7	3,934	64.1
Campania	552	405	73.4	5,832,418	5,200,771	89.2	130,089	62.1
Puglia	258	222	86.0	4,079,702	3,622,205	88.8	126,938	89.8
Basilicata	131	75	57.3	590,601	479,756	81.2	10,379	57.3
Calabria	409	263	64.3	2,008,709	1,501,536	74.8	31,133	57.5
Sicily	390	267	68.5	5,037,799	4,110,456	81.6	68,935	83.1
Sardinia	377	163	43.2	1,671,001	1,102,231	66.0	48,016	64.1
South	**2,558**	**1,673**	**65.4**	**20,875,700**	**17,414,542**	**83.4**	**473,288**	**72.0**
Italy	**8,111**	**5,459**	**67.3**	**60,216,650**	**49,218,771**	**81.7**	**1,457,721**	**47.0**

	Agreements	Average inhabitants under the agreements	Average amount managed under the agreements
	n	n	t
North	148	145,024	4,626
Centre	106	97,553	2,828
South	540	32,249	876
Italy	**794**	**61,988**	**1,836**

Table 6

Resources allocated to the parties under the agreements in 2015. Detailed by areas.

Source: Comieco

Area	Inhabitants under the agreements	Quantità					
		Managed packaging	FMS	Total	Managed packaging	FMS	Total
	n	t	t	t	kg/ab	kg/ab	kg/ab
North	21,463,592	485,164	199,547	684,711	22.6	9.3	31.9
Centre	10,340,637	202,580	97,141	299,721	19.6	9.4	29.0
South	17,414,542	296,401	176,887	473,288	17.0	10.2	27.2
Italy	**49,218,771**	**984,145**	**473,576**	**1,457,721**	**20.0**	**9.6**	**29.6**

Area	Inhabitants under the agreements	Risorse economiche					
		Managed packaging	FMS	Total	Managed packaging	FMS	Total
	n	EUR	EUR	EUR	EUR/ab	EUR/ab	EUR/ab
North	21,463,592	46,072,144	3,383,728	49,455,872	2.15	0.16	2.30
Centre	10,340,637	18,849,909	1,570,242	20,420,151	1.82	0.15	1.97
South	17,414,542	25,687,777	2,894,698	28,582,475	1.48	0.17	1.64
Italy	**49,218,771**	**90,609,830**	**7,848,668**	**98,458,498**	**1.84**	**0.16**	**2.00**

Agreements are well-known instruments, used across the whole country. Each party to the agreements entrusts Comieco with a share of materials allowing to maximize revenues. In the North and Centre, in particular, only a share of the collected material is entrusted to Comieco, whereas the rest is managed via other operators.

In this context, the amounts managed by Comieco in 2015 remain unchanged, whereas considerations increase by 4% - this is the effect of the enforcement of the Technical Annex on Paper, which came fully into force during last year.

Table 7

Comieco-Ancitel Energia&Ambiente tender for the purchase of equipment to support separate paper and board collection and Plan for Southern Italy. Detailed by regions.

Source: Comieco

Area	Region	2014 Cities	2014 Inhabitants	2014 Funded amount	2015 Cities	2015 Inhabitants	2015 Funded amount
		n	n	EUR	n	n	EUR
North	Emilia Romegna	--	--	--	3	26,401	64,929.31
Centre	Tuscany	1	3,367	9,160.00	1	22,495	48,640.26
Centre	Latium	18	164,714	258,071.01	13	16,604	75,347.20
South	Abruzzo	11	18,837	67,385.24	7	14,653	21,026.00
South	Molise	3	59,290	48,372.20	--	--	--
South	Campania	17	289,262	532,341.88	9	107,036	275,584.69
South	Puglia	22	264,187	313,728.36	6	165,341	222,972.28
South	Basilicata	3	33,565	45,842.77	2	12,654	30,167.55
South	Calabria	18	98,652	248,213.58	22	130,592	429,049.04
South	Sicily	8	120,328	245,138.34	24	286,434	553,149.25
	Total	**101**	**884,121**	**1,501,022.37**	**87**	**716,710**	**1,531,948.81**

Collection is not promoted through considerations only, but also through additional technical and communication support activities. With the Comieco-ANCI Tender, almost 200 Cities with collection deficits were supported in the 2014/2015 period with allocations for the purchase of equipment to strengthen the service. A new tender was launched in 2016 with a double allocation.

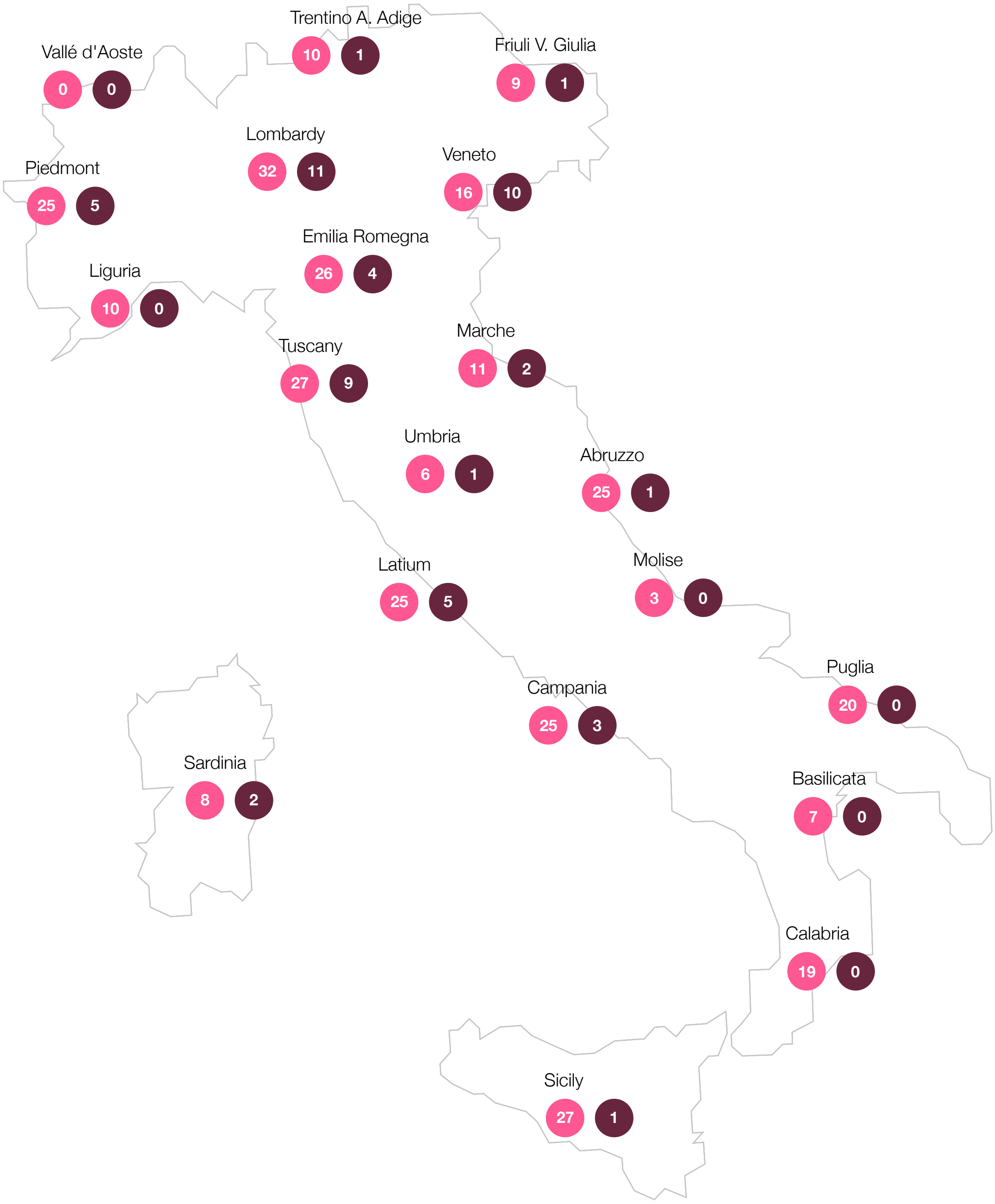
Projects involving over 1 million inhabitants were reviewed and judged eligible for funding.

Figure 8

The recycling network. Year 2015.

Source: Comieco

- Sorting plants under the agreements
- Paper mills (plants)



Area	Sorting plants under the agreements n	Mean distance for conferment km	Paper mills (plants) n
North (*)	128	17,3	32
Centre	69	16,4	17
South	124	17,8	7
Total	**321**	**17,3**	**56**

(*) one paper mill is based within the territory of the Republic of San Marino

Comieco also ensures recycling by awarding the materials in auctions. Based on the commitments made in 2011 with AGCM, 24 parties were awarded in 2015 for management of approximately 580thousand tons of paper and board for recycling. Ninety-five percent of this material was anyway recycled in Italian plants.

Figure 9

Status of the agreements upon expiration of each framework agreement and coverage rates of the agreements. 2001-2015 historical data set.

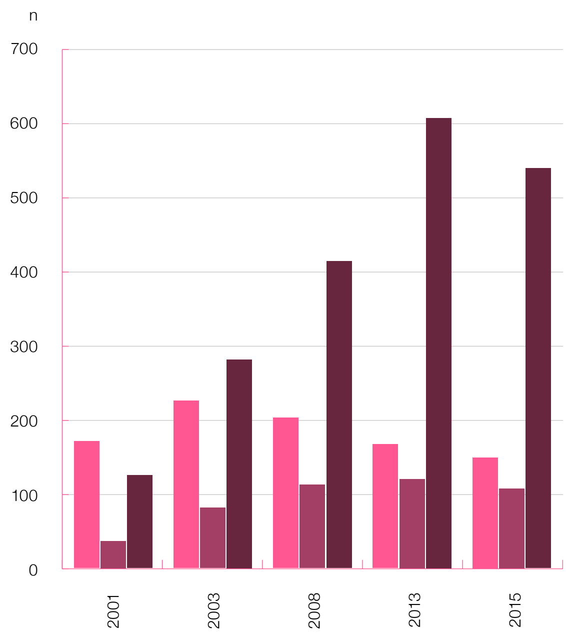
Source: Comieco

- North
- Centre
- South
- Italy

Covered inhabitants

Covered Cities

Signed agreements

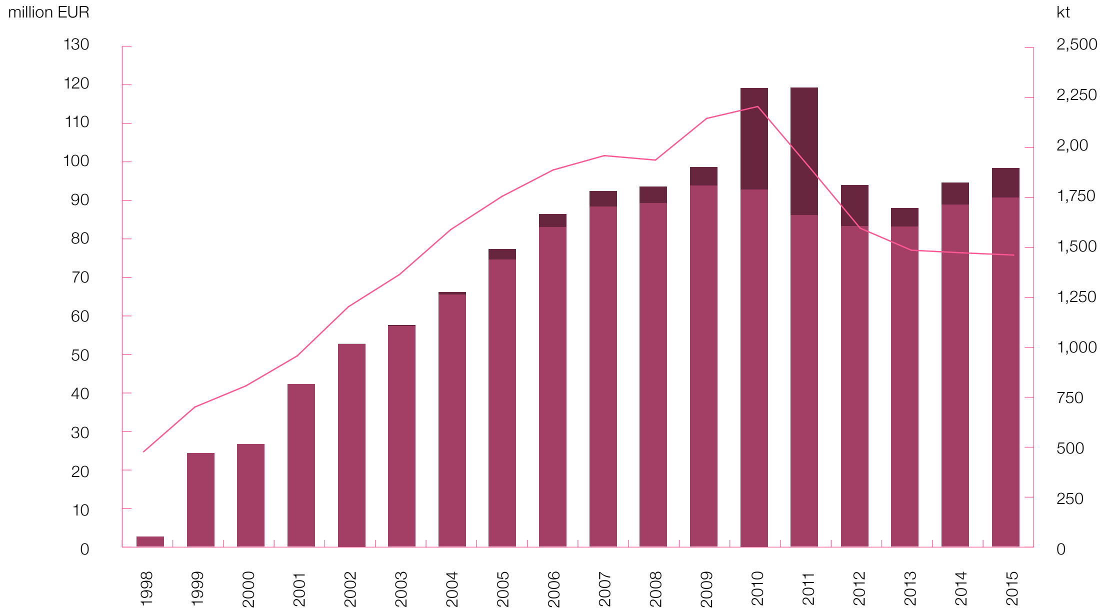


High fragmentation is observed in terms of stakeholders in the South. The high number of contracts weighs on the management, control, and development processes.

Figure 10

Economic investment. 1998-2015 historical data set.

Source: Comieco



		1st ANCI-CONAI Agreement 1998-2003	2nd ANCI-CONAI Agreement 2004-2008	3rd ANCI-CONAI Agreement 2009-2013	4th ANCI-CONAI Agreement 2014-2015	Total
Packaging	million EUR	204.2	400.3	439.0	179.4	**1,222.9**
FMS	million EUR	0.4	15.3	80.2	13.6	**109.6**
Total	million EUR	204.6	415.6	532.5	211.2	**1,363.9**
Managed collection	t	5,523,979	9,088,263	9,295,707	2,926,818	**26,834,767**

			2014	2015	Δ 2014-15
Economic investment	Packaging	million EUR	88.8	90.6	2.0%
	FMS	million EUR	5.8	7.8	35.3%
	Total	million EUR	94.6	98.5	4.1%
Managed collection		kt	1,469	1,458	-0.8%

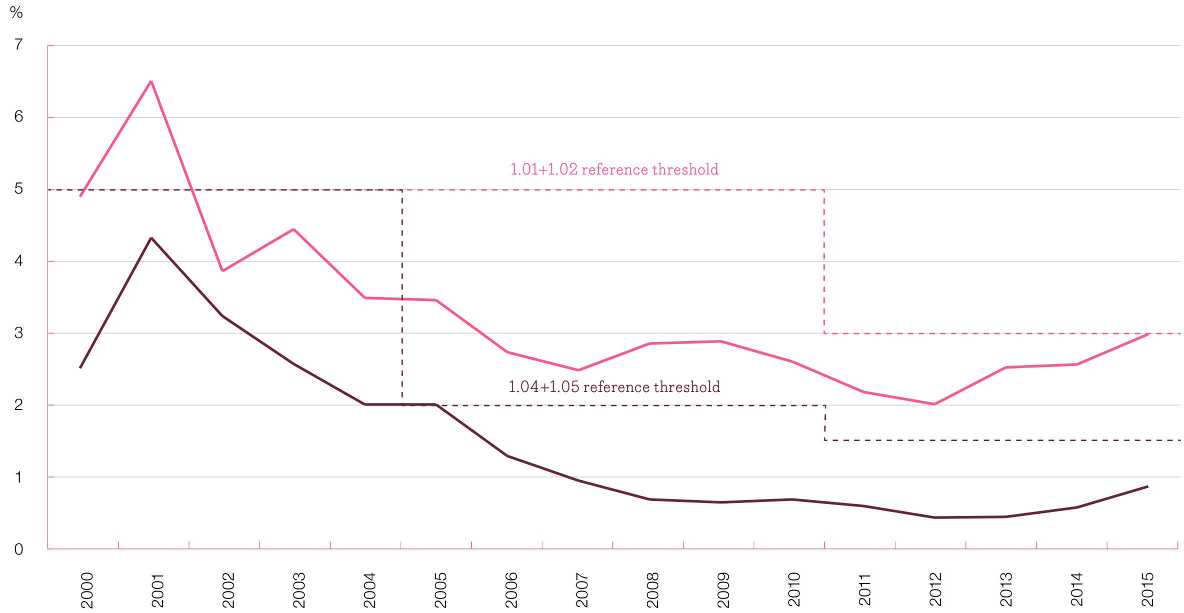
Comieco managed almost 27 million tons of paper and board collected by the Cities and provided considerations for over 1.3 billion EUR from 1988 to 2015.

Figure
11

Quality
of the collected
material
(mean trend of
foreign fractions).
2000-2015
period

Source:
Comieco

— 1.01+1.02
— 1.04+1.05



			1st ANCI-CONAI Agreement 1998-2003	2nd ANCI-CONAI Agreement 2004-2008	3rd ANCI-CONAI Agreement 2009-2013	4th ANCI-CONAI Agreement 2014-2015	Total
1.01+1.02	Analyzed amounts	kg	188,638	811,898	1,135,220	252,227	**2,387,984**
	Performed tests	n	1,006	3,456	4,040	1,353	**9,855**
1.04+1.05	Q.tà analizzate	kg	120,740	709,776	966,937	165,597	**1,963,050**
	Performed tests	n	594	3,591	4,204	1,039	**9,428**

Note: The above results, until June 2014, refer to the total tests performed on both incoming and outgoing materials in order to determine the considerations due to the parties under the agreements. From July 2014 these results only refer to tests on incoming materials performed to determine the consideration.

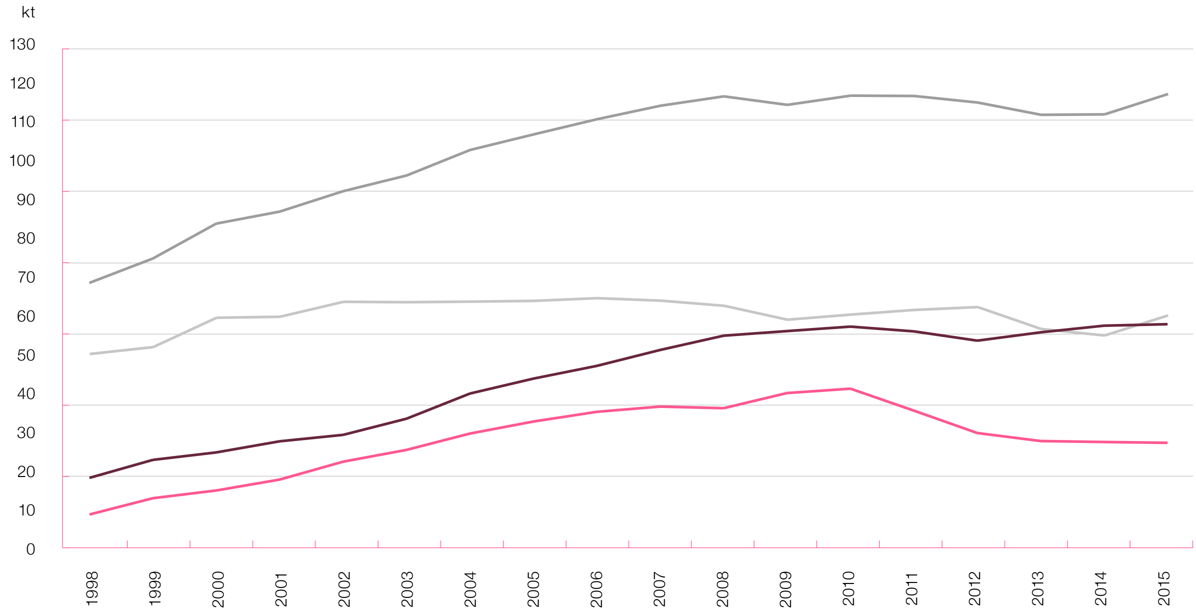
Tests highlight a high quality of the collected materials, also in the light of the new and more accurate testing methods. Quality and control pose the toughest challenges in the framework agreement in force.

Figure 12

Ratio of apparent collection to total paper and board collection managed under the agreements. Historical data set of framework agreements and 2014-2015 comparison.

Source: Comieco

— Apparent Collection
— Municipal SC of paper and board
— Municipal SC of paper and board under the agreements
— Private collection



		1998	2003	2008	2013	2014	2015	Δ t 1998/2015	Δ % 1998/2015
Apparent collection	kt	3,749	5,227	6,316	6,062	6,068	6,348	2,319	61.9
Municipal separate paper and board collection	kt	1,001	1,810	2,945	2,991	3,082	3,102	2,081	207.9
Municipal separate paper and board collection under the agreements	kt	485	1,362	1,928	1,482	1,469	1,458	984	202.9
Private collection	kt	2,748	3,417	3,371	3,071	2,987	3,246	238	8.7
Municipal separate paper and board collection under the agreements vs, Apparent collection	%	12.9	26.1	30.5	24.4	24.2	23.0		

Comieco is a major player in the overall management of paper and board collection, confirming its subsidiary role with respect to the market.

Table 8

Direct and indirect benefits of paper and board packaging recycling managed by Comieco.

Source: CONAI data processed by studio Fieschi for CONAI

Analyzed physical boundaries (managed by COMIECO)

Indicators within the CONAI boundaries (managed)

Indicator		Value
Amount of conferred packaging	kt/year	984
Fractions for recycling	kt/year	984
Fractions for energy recovery	kt/year	0
Fractions for other forms of disposal	kt/year	0

Environmental benefits

Indicator		Value
Secondary raw material obtained from recycling	kt/year	984
Electric power produced from energy recovery	TJ/year	0
Thermal power produced from energy recovery	TJ/year	0
Saving of primary energy through recycling	TJ/year	12,446
CO_2 production avoided through recycling	kt CO_2 eq/year	906
CO_2 production avoided through energy recovery	kt CO_2 eq/year	0

Economic value

Category			Value
Direct benefits	Economic value of the secondary raw material obtained from recycling	million EUR/year	61
	Economic value of the power produced from energy recovery	million EUR/year	0
Indirect benefits	Economic value of the avoided CO_2 production	million EUR/year	27

The LCC analysis allows to estimate the energy-related benefits deriving from packaging recycling and to attribute an economic value thereto. In 2015, the recycling of 984thousand tons of packaging results into 88 million EUR benefits. It should be noted, however, that recycling benefits decrease as industrial process and energy production efficiencies increase.

Table 9

Paper and board production in 2015.

Source: ISTAT data processed by Assocarta and Assocarta estimates

		Production (A)	Import (B)	Export (C)	Apparent consumption (A+B-C)
Packaging (Paper, board, and cardboard)	t	4,288,040	2,901,852	1,425,910	**5,763,982**
Δ 2014/15	%	4.0	8.7	5.9	**5.8**
Other paper and board (paper for graphic and hygienic-sanitary use)	t	4,552,783	2,139,112	2,513,988	**4,177,907**
Δ 2014/15	%	0.6	-5.3	0.7	**-2.6**
Total paper production	t	**8,840,823**	**5,040,964**	**3,939,898**	**9,941,889**
Δ 2014/15	%	2.2	2.3	2.5	**2.1**

Table 10

Consumption, import, export of paper for recycling and apparent collection* - 2014-2015 variations.

Source: Assocarta data processed by Comieco

		Import	Export	Consumption	Apparent collection
2014	kt	310	1,678	4,700	**6,068**
2015	kt	325	1,822	4,852	**6,348**
Δ 2014/15	%	5.0	8.6	3.2	**4.6**

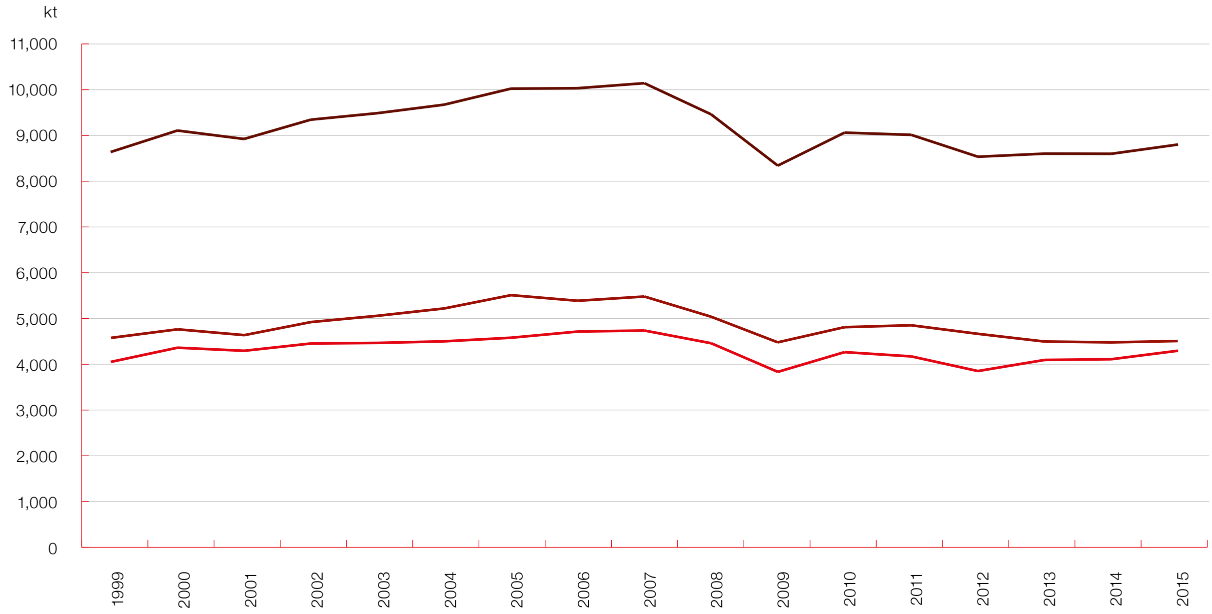
* Apparent collection: Consumption - Import + Export

The production of paper packaging and paper for hygienic-sanitary use generally offsets the decline of graphic paper production. Import-export trends are particularly strong in this context.

Figure 13

Paper and board production. 1999-2015 historical data set.

Source: ISTAT data processed by Assocarta and Assocarta estimates



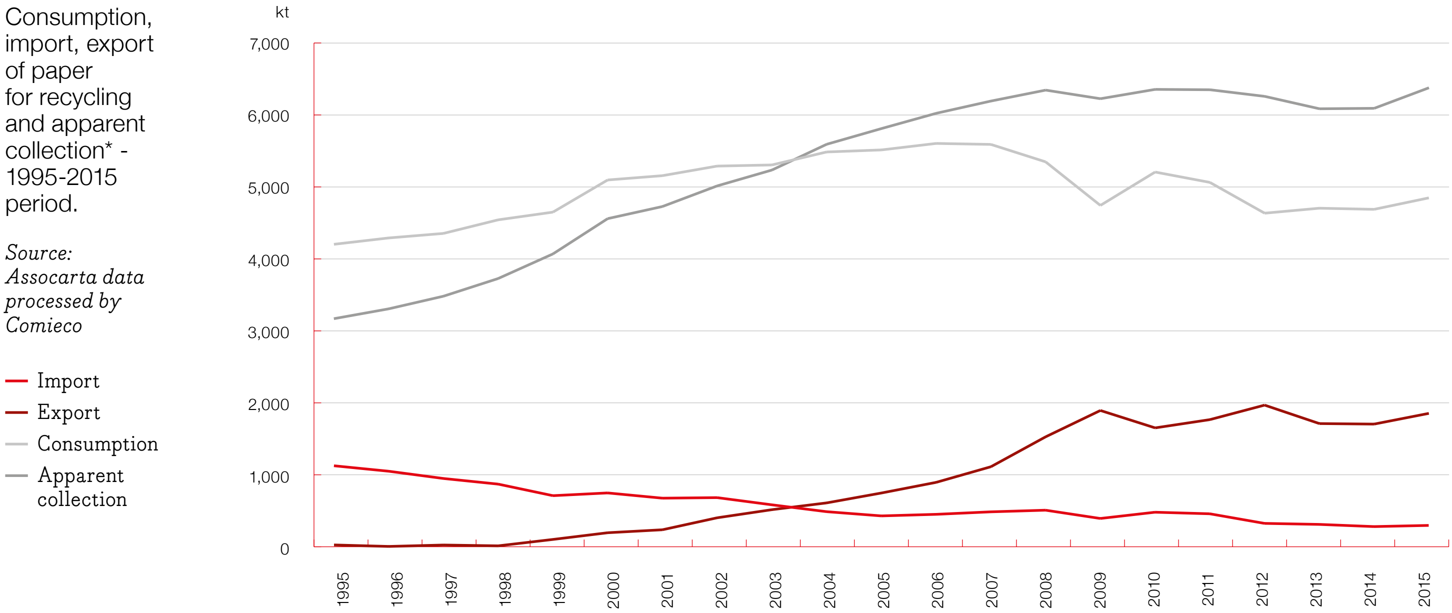
	Paper production (kt)		
	Packaging	Other paper and board	Total paper production
1999	4,071	4,615	8,686
2000	4,347	4,784	9,131
2001	4,287	4,669	8,956
2002	4,429	4,927	9,356
2003	4,440	5,051	9,491
2004	4,471	5,196	9,667
2005	4,541	5,458	9,999
2006	4,661	5,347	10,008
2007	4,681	5,431	10,112
2008	4,434	5,033	9,467
2009	3,877	4,527	8,404
2010	4,261	4,826	9,087
2011	4,178	4,864	9,042
2012	3,893	4,695	8,588
2013	4,109	4,543	8,652
2014	4,123	4,526	8,649
2015	4,288	4,553	8,841

The moderate recovery of production switches the total back to the values of 15 years ago, however far from the peak values of production in the mid-2000s.

Figure 14

Consumption, import, export of paper for recycling and apparent collection* - 1995-2015 period.

Source: Assocarta data processed by Comieco



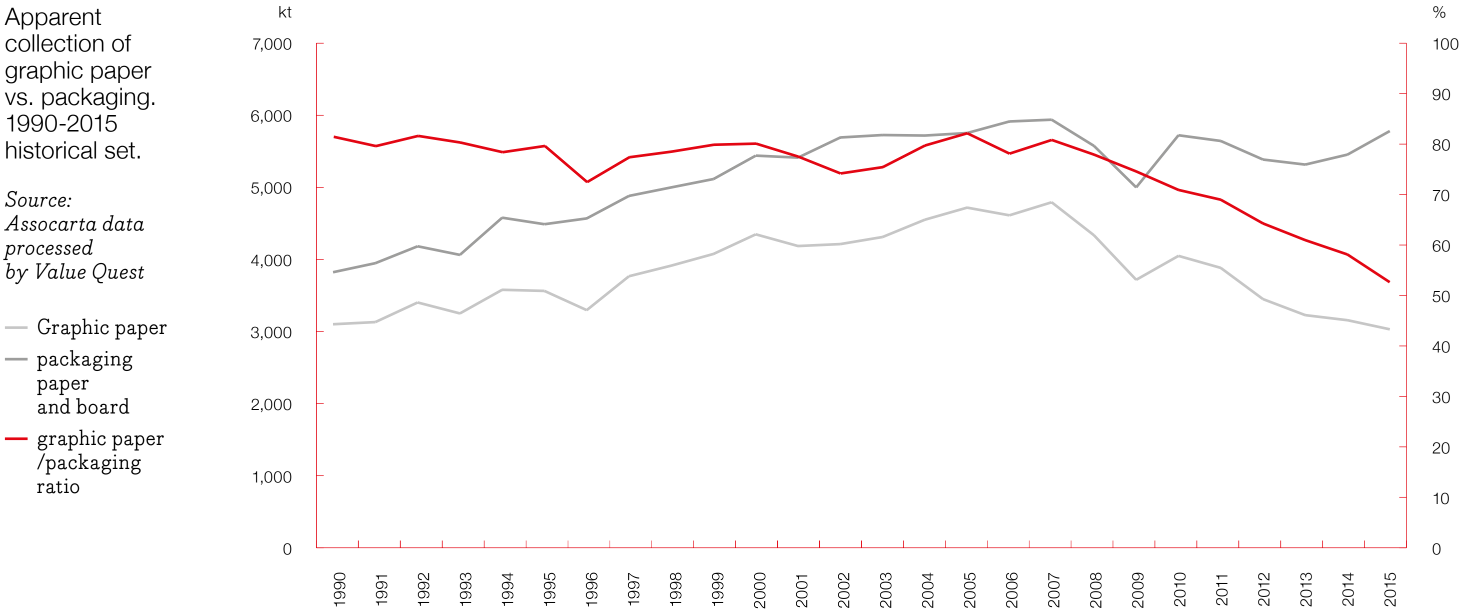
* Apparent collection: Consumption - Import + Export

Exports exceed 1.8 million tons with a net 1.5 million ton balance. Seventy percent is headed towards the Far East.

Figure 15

Apparent collection of graphic paper vs. packaging. 1990-2015 historical set.

Source: Assocarta data processed by Value Quest



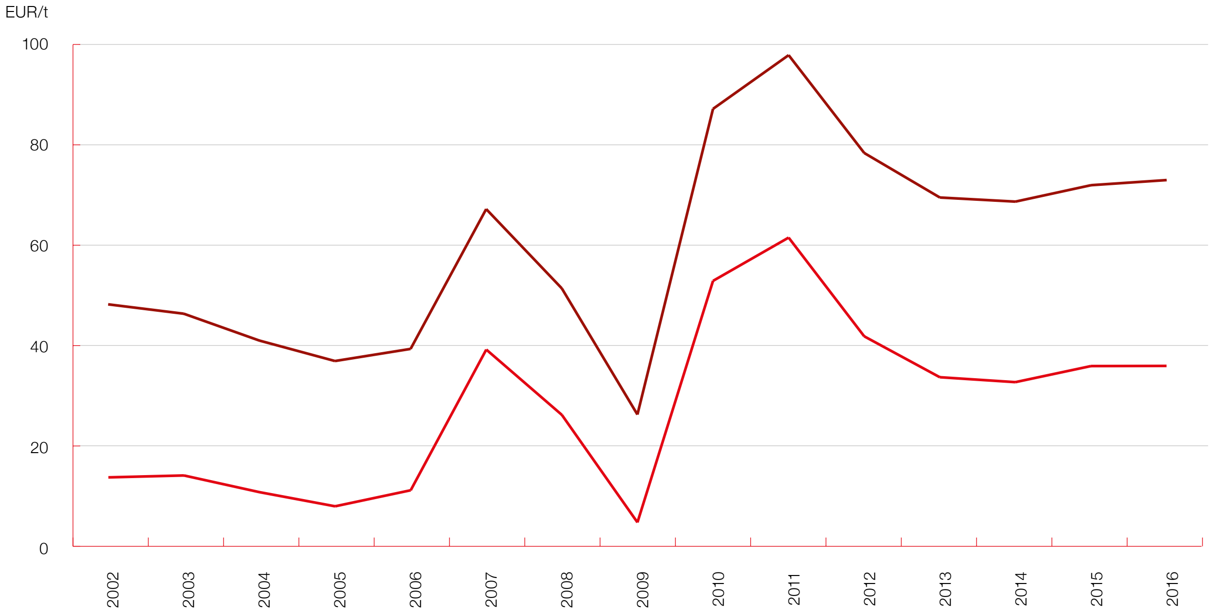
The ratio of graphic paper consumption to packaging paper consumption gradually changed in time. This phenomenon appeared in 2009 and developed in time until 2015. The different composition of the consumption mix also brings about a significant change of the "quality" of the collected materials and of subsequent issues connected with the processing of paper for recycling.

Figure 16

Mean annual values of paper for recycling. 2002-2015 period.

Source: Milan Chamber of Commerce

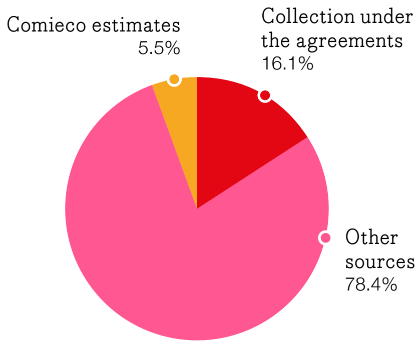
— 1.01 mixed non-sorted paper and board
— 1.04 paper and corrugated board



Prices gradually increased in the first months of 2015, combined with more stable dynamics compared to the strong fluctuations of the mid-2000s.

Note on method

Sources and methodology



The processing method adopted for data on national paper and board collection is the same as in the previous years. Some of the collection data is updated, particularly for the regions of Piedmont, Lombardy, Trentino A.A., Latium, Campania, and Sardinia. The related data (area and national data, per-capita data, etc.) is also updated.

Data processed by Entities and/or organizations in charge of the monitoring or management of waste flows (ISPRA; Regions, Agencies, Provinces and Work Groups, ANCI, Cities, operators, plants, etc.) was used to determine separate paper and board collection levels.

The data thus acquired is overlapped and compared to the data available to Comieco within the framework of its activities (management of the agreements) to ensure consistency and, if necessary, to carry out further focused reviews. Processing is made at province level and, if necessary and possible, a more in-depth analysis is performed (e.g. Cities).

Whenever "official" data was not available, Comieco estimated the provincial level of collection starting from the data on collection by the parties under the agreements. Estimates consider separate paper and board collection as being actively in place across the national territory. As to evaluations vs. 2015, constituting the object of this Report, 78.4% of collection data comes from third-party sources; 16.1% refers to the amounts managed directly by the Consortium, or notified by the parties to the agreements as provided for by the Technical Annex (without any other sources), and 5.5% is based on estimated amounts.

COMIECO
National consortium for Recovery and Recycling
of Paper and Board Packaging

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Paper and board recycling and collection in Italy

> A recycled box comes back to life within less than 2 weeks.
> A newspaper page comes back to life after just one week.

Separate paper and board collection and recycling offer a perfect model of circular economy

All this is ensured by Comieco, supported by a widespread network of 321 sorting plants that receive the paper and board collected separately by the Italian citizens throughout the Country and provide for their processing.
After sorting, paper is available for recycling by the 56 paper mills operating across the national territory.

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Paper and board recycling results for Italy in 2015

comieco
Consorzio Nazionale Recupero e Riciclo degli Imballaggi a base Cellulosica

89%

Rate of recovery

of the paper and board packaging consumed and collected separately in Italy

80%

Rate of recycling

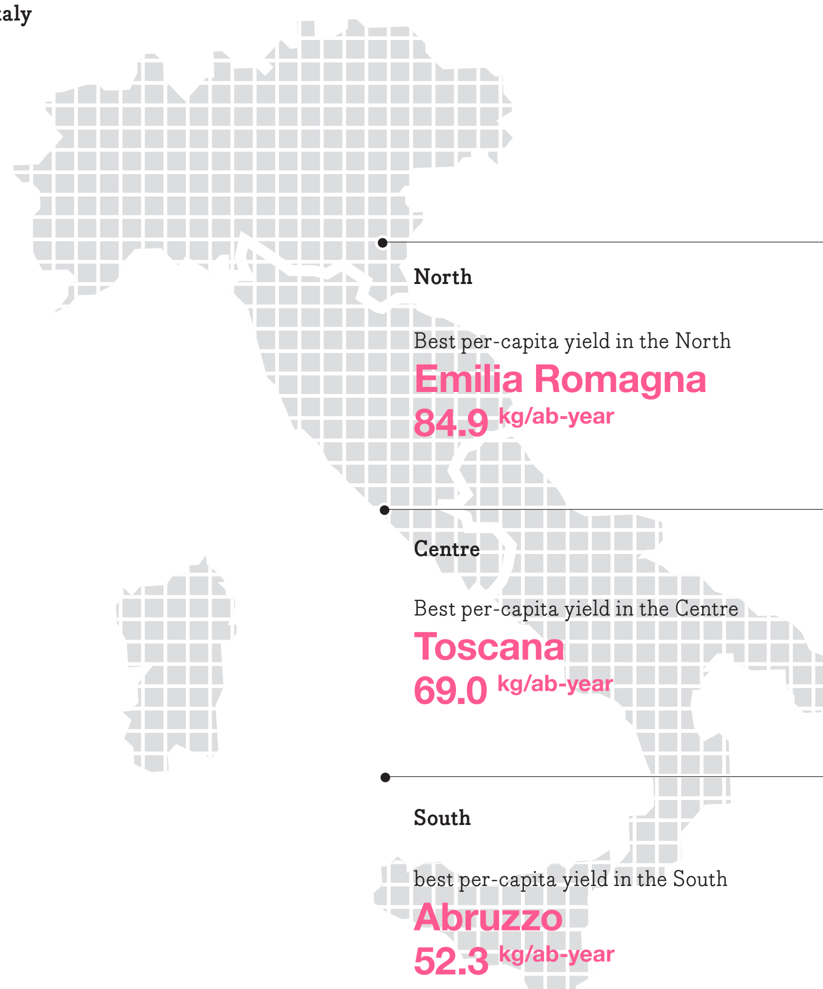
of the paper and board packaging consumed and collected separately in Italy

10t

Amount of paper for recovery recycled each minute

nella produzione di materia prima per imballaggi il tasso di utilizzo del macero supera l'80%

Municipal separate paper and board collection



		Per capita	Volumes
Italy		51,5 kg/ab-year Δ 2014 - 2015 **+0.5 %** Δ 1998 - 2015 **+202.9 %**	3.102.369 t including **1,457,721 t** - i.e. **47%** - managed by Comieco
North	Best per-capita yield in the North Emilia Romagna 84.9 kg/ab-year	62,0 kg/ab-year Δ 2014 - 2015 **-0.7 %** Δ 1998 - 2015 **+119.1 %**	1.701.473 t including **684,711 t** - i.e. **40.2%** - managed by Comieco
Centre	Best per-capita yield in the Centre Toscana 69.0 kg/ab-year	62,6 kg/ab-year Δ 2014 - 2015 **+0.2 %** Δ 1998 - 2015 **+266.1 %**	743.898 t including **299,721 t** - i.e. **40.3%** - managed by Comieco
South	best per-capita yield in the South Abruzzo 52.3 kg/ab-year	31,5 kg/ab-year Δ 2014 - 2015 **+4.1 %** Δ 1998 - 2015 **+1,212.5 %**	656.998 t including **473,288 t** - i.e **72.0%** - managed by Comieco

Comieco agreements – the numbers

Comieco enters into agreements with the Cities and operators to ensure the recycling of such a share of paper and board as to maximize revenues and optimize management. In 2015, the Consortium managed 1.5 million tons of paper and board under the agreements. More than 1.65 million tons of materials collected at municipal level are managed out of the Comieco agreements. Each party under the agreements can establish a tailor-made relation with the Consortium based, for example, on partial collection management.

Covered inhabitants

Italy	North	Centre	South
78.2%	87.0%	83.4%	81.7%
49,218,771 inhabitants	21,463,592 inhabitants	10,340,637 inhabitants	17,414,542 inhabitants

Covered Cities

Italy	North	Centre	South
68,6%	66,3%	65,4%	67,3%
5,459 Cities	3,115 Cities	671 Cities	1,673 Cities

Considerations granted by Comieco for the share of paper and board managed under the agreements

Italy	North	Centre	South
98.5 million EUR	49.5 million EUR	20.4 million EUR	28.6 million EUR
i.e. 2.00 euro/ab on average	per una media di 2.31 euro/ab on average	i.e. 2.30 euro/ab on average	i.e. 1.64 euro/ab on average

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