



# SMARTENVI PROJECT

SMART DECISION TOOLS FOR REDUCING HAZARDS TO OUR  
ENVIRONMENT AND WATER RESOURCES BY REHABILITATING  
OPEN DUMPS

## NATIONAL REPORT ITALY



Co-funded by the  
Erasmus+ Programme  
of the European Union



*This project is funded by the Erasmus+ Programme of the European Union. However, European Commission and Turkish National Agency cannot be held responsible for any use which may be made of the information contained therein.*

**SMART DECISION TOOLS FOR REDUCING HAZARDS TO OUR ENVIRONMENT AND WATER  
RESOURCES BY REHABILITATING OPEN DUMPS**

**NATIONAL REPORT ITALY**

**TABLE OF CONTENT**

1.Introduction and information about solid waste (types, amounts, collection, management, etc.).....	4
1.1 Italian Data.....	4
1.2 A comparison with other European countries/ States .....	8
2.Solid waste disposal methods and statistics regarding them .....	13
3.Open-dumps data.....	17
3.1 Statistics, environmental and stability problems, active ones, closures, etc. ....	18
4.Studies about rehabilitation of open dumps (statistics, methods, status, etc.) .....	19
5.Legislations and directives about solid waste management and open dumps.....	22
6.Target Groups - Identification of them, how this project will contribute them better, what should be done to include more of them, etc., your proposal of the best strategy .....	24
7.Dissemination - Type of dissemination activities, possible associated partners, involvement of associated partners, how to get associated partners to involve more, etc., your dissemination plan .....	24
8.Conclusions and recommendations .....	25
9.References .....	26

## Figures

- Fig. 1.1.1 Trend in municipal waste production, between 2006 – 2019
- Fig. 1.1.2 Trend of municipal waste production and social-economic indicators, between 2002 – 2019
- Fig. 1.1.3 Percentage breakdown of USW management, year 2019
- Fig. 1.1.4 Evolution of regional percentages concerning separate collection (between 2004-2019)
- Fig. 1.2.1 Total Production of urban solid waste in Europe, between 2016-2018
- Fig. 1.2.2 Per capita production of solid municipal waste in the European area, between 2016-2018
- Fig. 1.2.3 Percentage breakdown of urban waste management in the European area- 2018
- Fig. 1.2.4 Amounts of municipal solid waste disposed through other disposal operations (D1, D7, D12), in the European area
- Fig. 1.2.5 Amount of urban solid waste going to energy recovery (R1) in the European area
- Fig. 1.2.6 Total Amount of urban solid waste going to recycling in the European, year 2018
- Fig. 1.2.7 Per capita amount of urban solid waste going to recycling in the European area, year 2018
- Fig. 2.1 Percentage of landfill disposal compared to the percentage of waste collection in 2007 – 2019
- Fig. Fig. 2.2 Percentage of urban waste disposed of through landfill without previous treatment, for each Italian region, year 2019
- Fig. 2.3 Per capita waste disposed of through landfill for each Italian region, year 2019.
- Fig. 3.1 Geographical distribution of urban solid waste landfills in Italy, year 2019
- Fig. 4.1 Picture of an open-dump
- Fig 4.2 List of landfills in Italy, year 2020

## Tables

- Table 3.1.1 Critical elements in the open-dumps management

# 1.Introduction and information about solid waste (types, amounts, collection, management, etc.)

The present report provides data concerning updated databases and national reports on Municipal Solid Waste production and management in Italy.

In particular, reference has been made to the recent (national) Urban/Municipal Waste Report 2020, which can be downloaded- for all details- from the website:

<https://www.isprambiente.gov.it/it/pubblicazioni/rapporti/rapporto-rifiuti-urbani-edizione-2020>

The report was drawn up by ISPRA, the Higher Institute for Environmental Protection and Research (as part of Ministry of the Environment), which oversees regional Environmental Agencies (ARPA).

The main roles and responsibilities of these organizations are as follows:

- Management and monitoring of air, water and soil pollution as well as electromagnetic and acoustic pollution (sources and main factors);
- Monitoring of different environmental elements: climate, air quality, soil and water components and level of acoustic pollution in the environment;
- Monitoring the compliance with and enforcement of the applicable rules ordered for the implementation of the provisions by competent authorities in the field of environmental protection;
- Technical-scientific, instrumental and analytical support to organizations having active managerial powers of administration in an environmental context;
- Development of an information system to support institutional and social organizations engaged in environmental protection activities.

The Urban/Municipal Waste Report, now in its twenty-second edition, is the result of a complex activity of collection, analysis and processing of data; through an effective and complete analysis on waste. The study provides a framework of objective information, timely and always up-to-date, that supports the decision-makers to apply appropriate policies and interventions, with the aim of monitoring their effectiveness and introducing, if necessary, any corrective measures.

The Urban Waste Report - Edition 2020 provides data, updated to 2019, concerning production, selectivity collection, management of municipal waste and packaging waste, including import/export at national, regional and provincial level. It also includes information on the monitoring of ISPRA concerning cost-efficiency of urban hygiene services and the application of a system of fees. Finally, it provides a picture of implementation levels of Regional Planning updated to the year 2020.

Therefore, special waste (RS) and hazardous waste produced by the industrial companies of the country, even if considered an important part of waste production and management, were not taken into account.

## 1.1 Italian Data

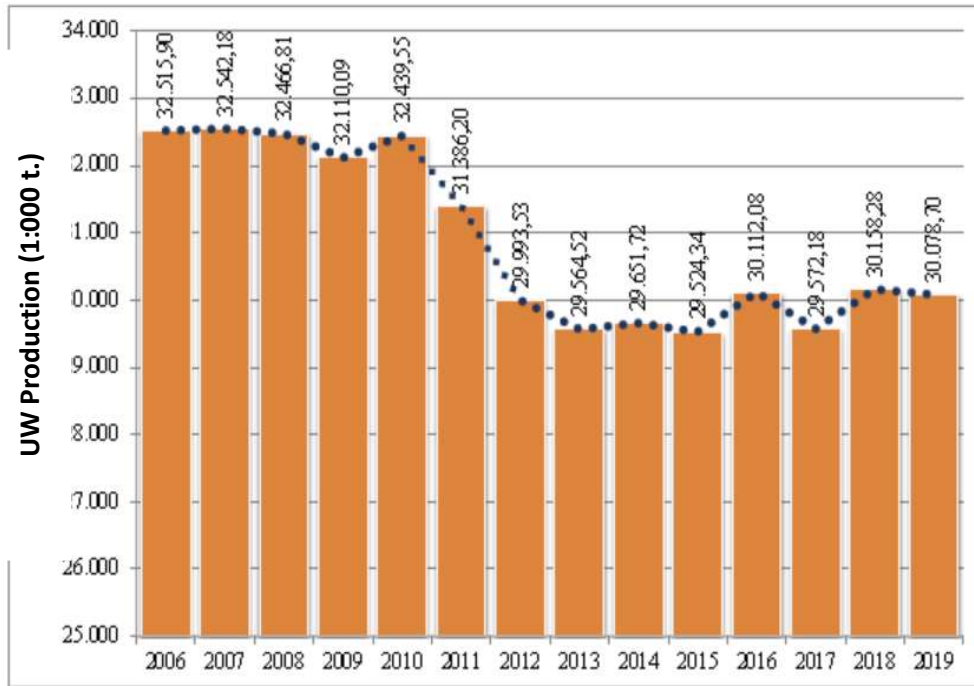


Fig. 1.1.1 Trend in urban/municipal waste production, between 2006 – 2019

Looking at the data, Figure 1.1.1 shows that the national production of urban waste in 2019, was about 30,1 million tons.

As from Figure 1.1.2 below, the production, that was steadily over 32 million tonnes until the last decade, after the effects of the economic crisis of 2008/2009 was at lower levels, keeping constant as a result of environmental policies to reduce the waste produced.

This correlation between waste production and socio-economic indicators is reflected and takes into account developments in national GDP and household expenditure.

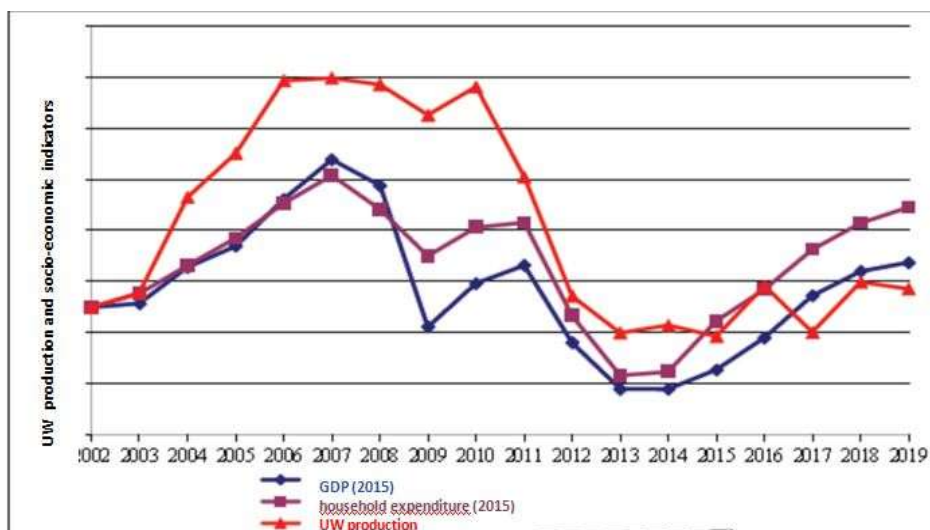


Fig. 1.1.2 Trend of urban/municipal waste production and social-economic indicators, between 2002 – 2019 (100 = GDP household expenditure in 2012).

The chart below (Fig. 1.1.3) shows the breakdown in percentage of solid urban waste management in Italy in 2019.

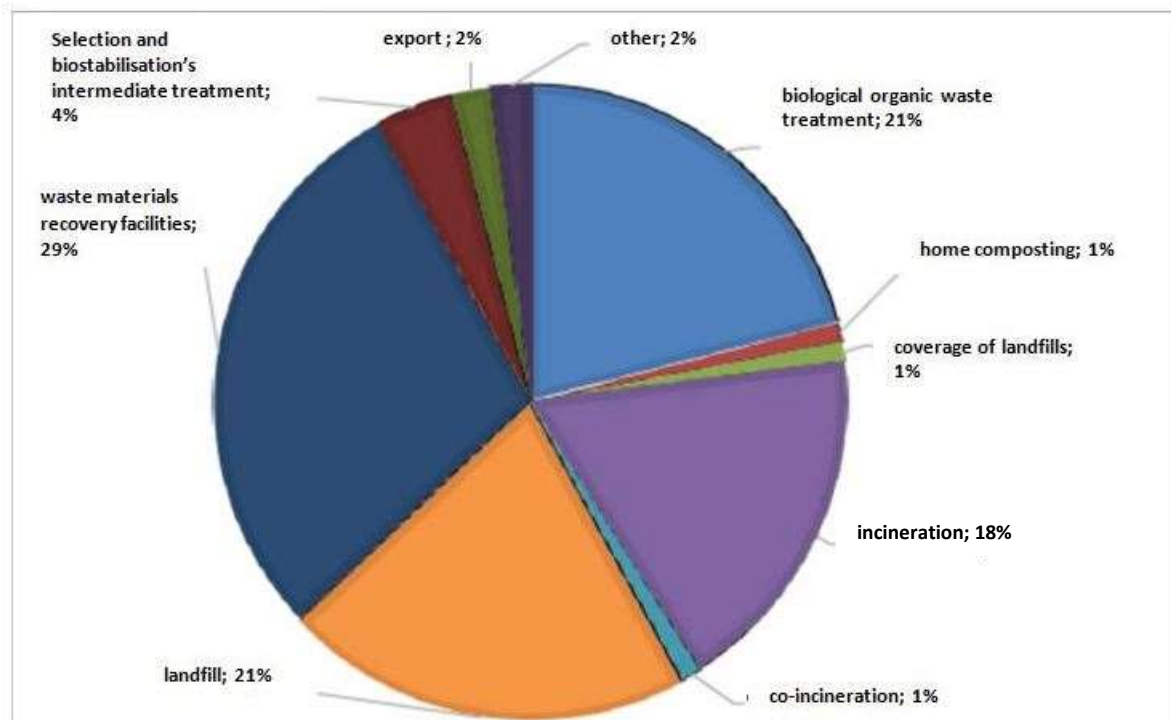


Fig. 1.1.3 Percentage breakdown of USW management, year 2019

The data analysis shows that 21% of the municipal waste produced is disposed in landfills. 50% of the waste produced is sent to treatment facilities to be separately collected: 21% is usually conveyed to composting plants -the Organic Fraction of Municipal Solid Wastes (wet + green)- and more than 29% is sent to the recovery plants that manage separate collection of other waste types.

18% of the municipal waste produced is incinerated, while 1% is sent to production facilities, such as cement plants, thermal power plants, etc. , to be used within the production cycle of energy; 1% is used, after proper treatment, for the covering of landfills, 4%- consisting of waste from Mechanical-Biological Treatment (MBT) plants- is sent to further treatments such as refining for the production of secondary fuel (CSS) or bio stabilization, 2% is exported (514 thousand tons) and 1% is managed directly by the citizens through home composting (267 thousand tons).

The data analysis highlights the need for a quick improvement of the management system, especially in some areas of the country, in order to allow the achievement of the new EU challenges based on the European legislation of reference.

Landfill disposal over the next 15 years will need to be halved, the percentage of waste destined to recovery operations, will be significantly increased to ensure the achievement of 60% of recycling

to 2030 and 65% to 2035. The need for a pace change is more urgent in view of the fact that the new targets have also introduced new calculation methods for both recycling and assessment of landfill disposal, which appear to be much more restrictive than those used today.

In particular, there is a need to increase the level of separated collection; despite an important growth in the percentages has been reached (see Figure 1.1.4), the level is still significantly behind the European average in some regions of the country.



*Fig. 1.1.4 Evolution of regional percentages concerning separate collection (between 2004-2019)*

In 2019, the highest proportions of separate collection were recorded in Veneto (74,7%)- as well as in 2018- followed by Sardinia (73,3%), Trentino Alto Adige (73,1%), Lombardia (72%), Emilia Romagna (70,6%) and Marche (70,3%).

Friuli-Venezia Giulia (67,2%) and Umbria (66,1%) exceeded 65%, such as the target laid down in the national legislation in the 2012.

## 1.2 A comparison with other European countries/ States

In the European context, Italy comes in fifth position in terms of urban/municipal waste production, after Germany, France, Turkey and UK (Figure 1.2.1).

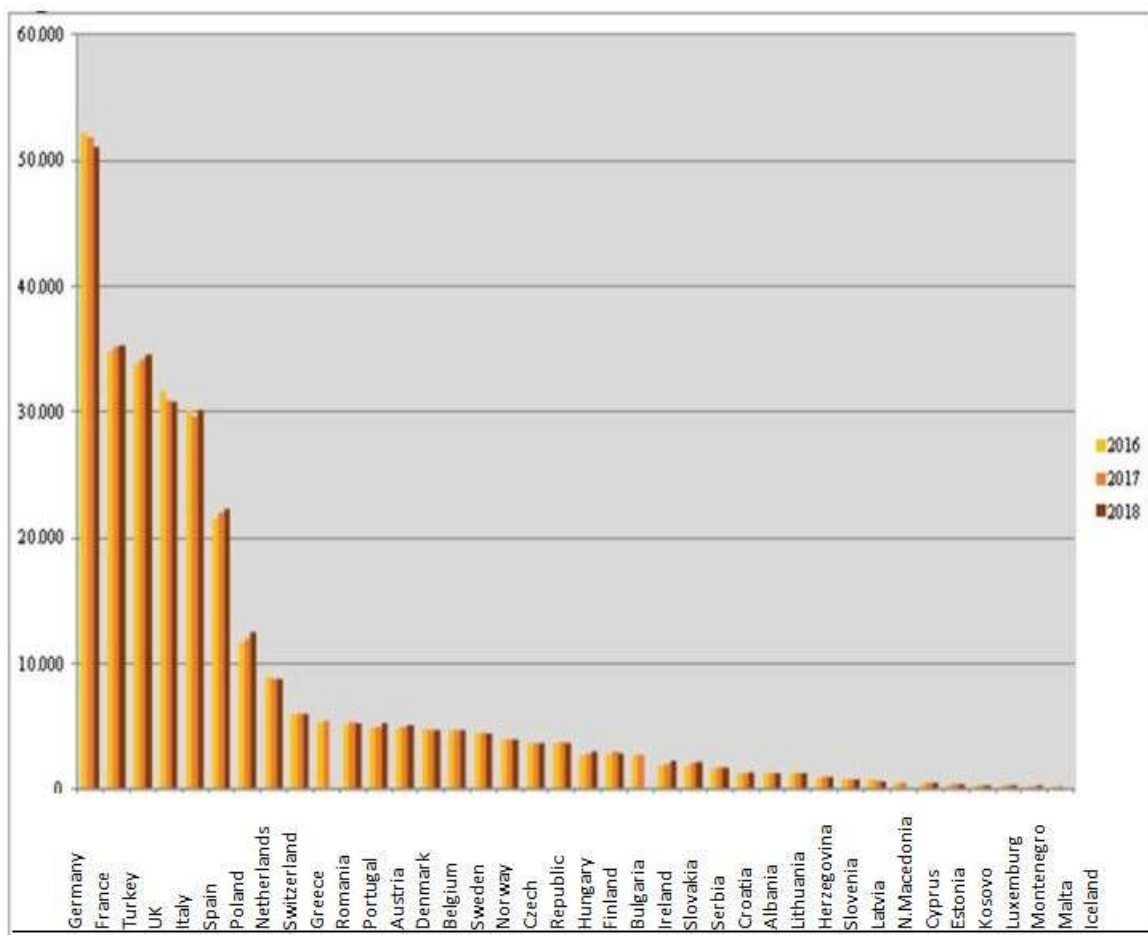


Fig. 1.2.1 Total Production of urban solid waste in Europe (tons x 1.000), between 2016-2018

In terms of production per capita, with a value of just under 500 Kg/ha/year, Italy is just above the European average (Figure 1.2.2), that is characterized by strong variability; it goes from 814 Kg/ha/year (Denmark) to 226 Kg/ha/year (Kosovo); data are also influenced by the way in which industrial waste is assimilated to urban waste.

For further details, please visit the Eurostat website at:



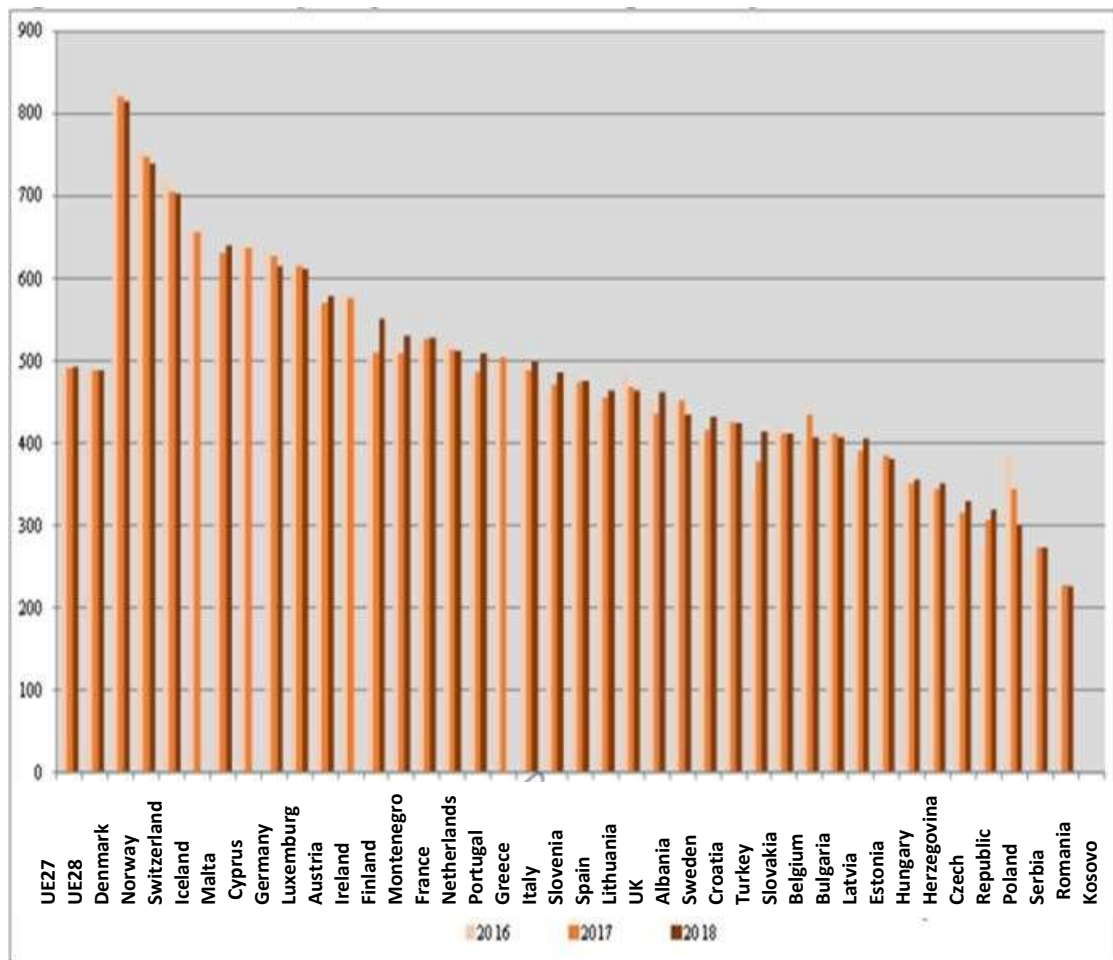


Fig. 1.2.2 Per capita production of solid urban/municipal waste (Kg/inhabitant/year) in the European area, between 2016-2018

Figure 1.2.3 shows the percentage breakdown of the main types of waste management, for each European country, following the Eurostat order (recycling, composting and anaerobic digestion, incineration, energy recovery, landfill), in the three-year period 2016 - 2018.

The graph shows an extreme variability of management approach to municipal waste among the different states.

With regard to disposal in the landfill, we can see percentage from 0% of Switzerland to 100% of Serbia. Switzerland, Sweden, Finland, Germany, Belgium, Denmark, the Netherlands, Austria and Norway make more use of Incineration (R1) with energy recovery rather than landfill (below 3.2%), from 31% in Germany to 57% in Finland. Incineration (D10) without energy recovery is hardly used.

Austria (33%), Lithuania (32%), the Netherlands (29%) have the highest proportion of urban waste addressed to composting and anaerobic digestion.

In terms of waste recycling, 23 out of 31 countries have achieved rates of over 20% of treated urban waste, with Slovenia (54%) and Germany (50%) as leading countries.

Italy recycles 32% of urban treated waste while 23% of waste goes to composting or anaerobic digestion with a total percentage of 55% of recycling.

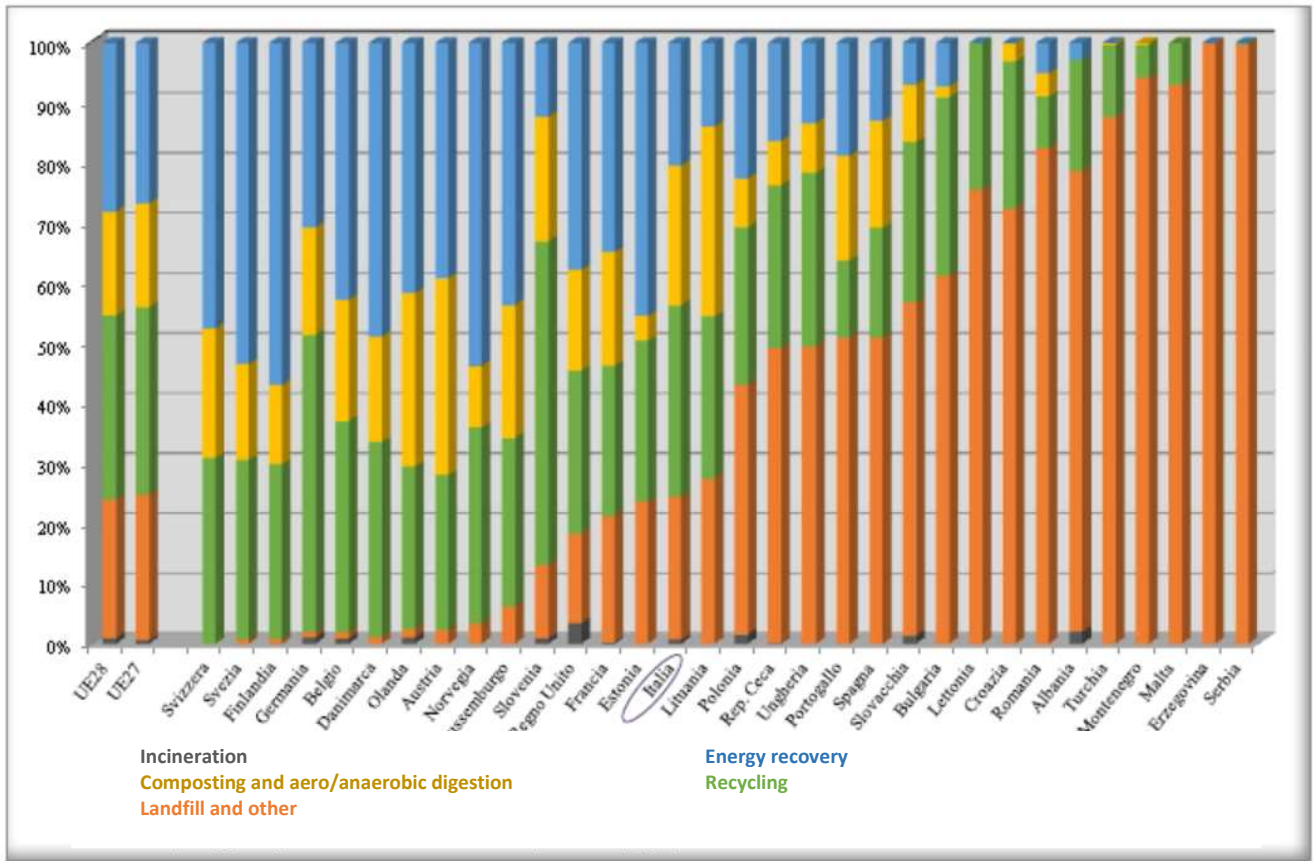


Fig. 1.2.3 Percentage breakdown of urban waste management in the European area- 2018  
Landfill disposal; Data ranked in ascending order of quantities.

Figure 1.2.4 shows data concerning the total and per capita amount of waste in each country in terms of urban waste disposal in a landfill.

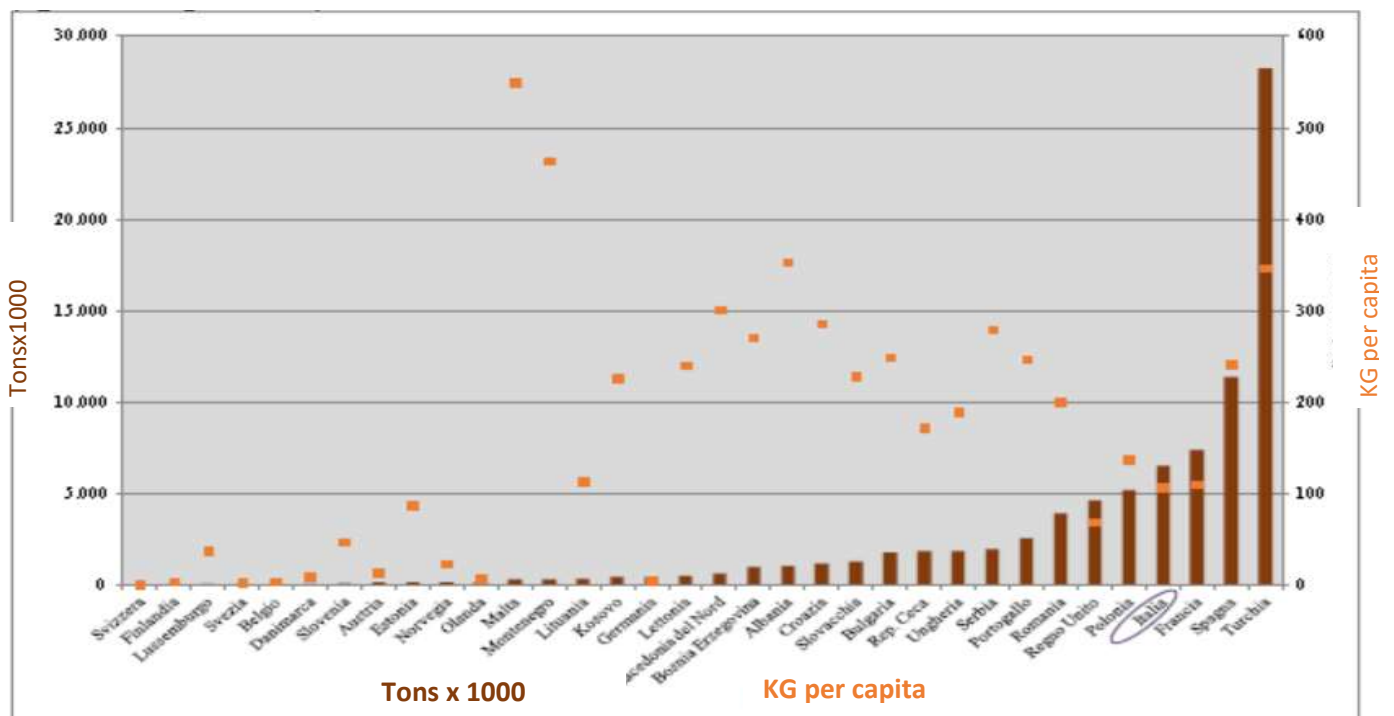


Fig. 1.2.4 Amounts of municipal solid waste landfilled and disposed through other disposal operations (D1, D7, D12), in the European area (tons x 1.000). Data ranked in ascending order of quantities and per capita (kg/inhabitant/per year), 2018

The value of waste disposal per capita in a landfill among the European Countries, in 2018 reached, on average, 111 kg/inhabitant per year, 6% less than in 2016.

Data vary from one country to another, from 550 kg/inhabitant per year of Malta, to 3 kg/inhabitant per year of Sweden. In the period 2016-2018, in Italy the rate decreased from 123 to 107 kg/inhabitant per year, with a 13 % reduction.

Figure 1.2.5 shows data related to urban waste recycling and energy recovery.

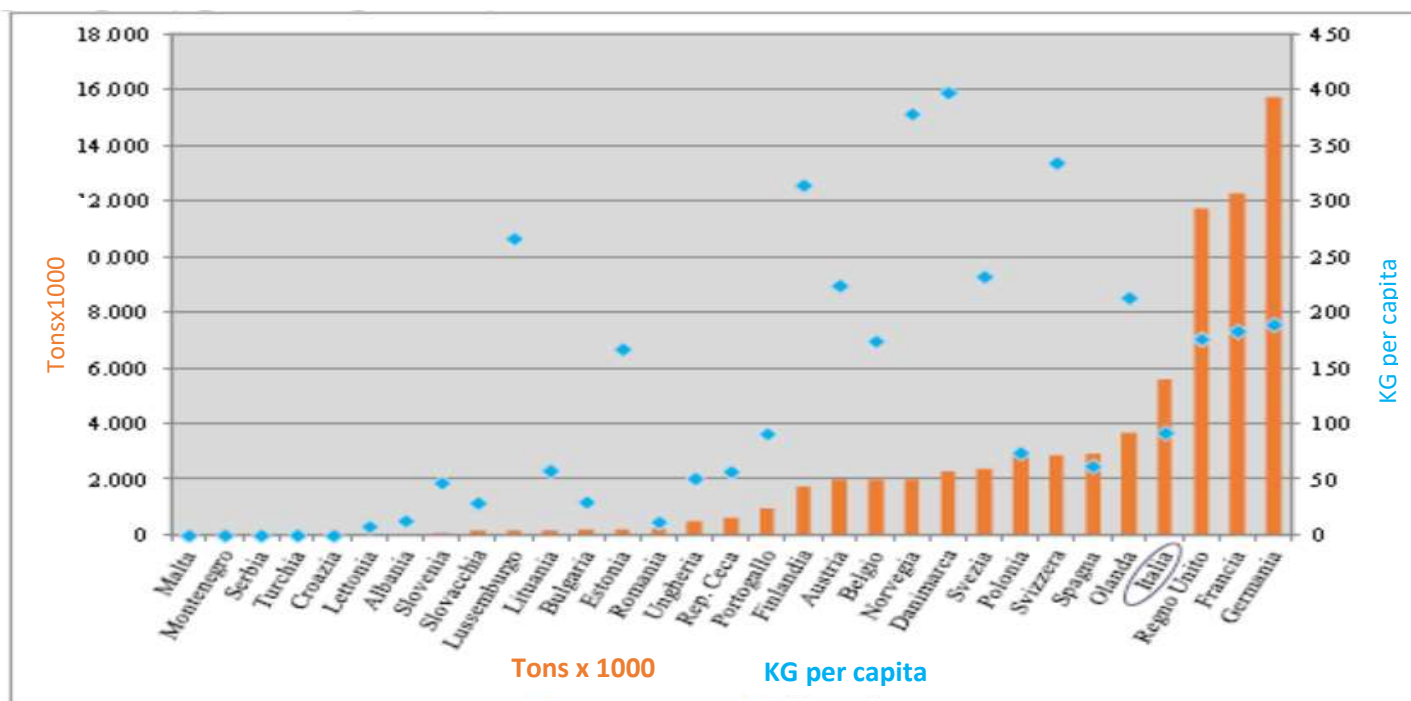


Fig. 1.2.5 Amount of urban solid waste going to energy recovery (R1) in the European area (tons x 1.000), Data ranked in ascending order of quantities and per capita (kg/inhabitant/per year), 2018

Germany is one of the countries to use energy recovery for the highest amount of urban waste. In fact in the three-year period 2016-2018, the amounts increased, by 10.1% equal to 1.4 million tons. A similar increase of 10.1% in the three-year period can be attributed to the United Kingdom (about 1.1 million tonnes).

As well an increase occurred in Italy, in the same period, where the percentage rose by 44,2% (which amount to 1,7 million tons); in this three-year period Italy varied between 64 kg/ha and 92 kg/ha per year, with a 43,8% increase.

Figure 1.2.6 below shows the urban waste amounts going to recycling, including recovery of materials, composting and anaerobic digestion.

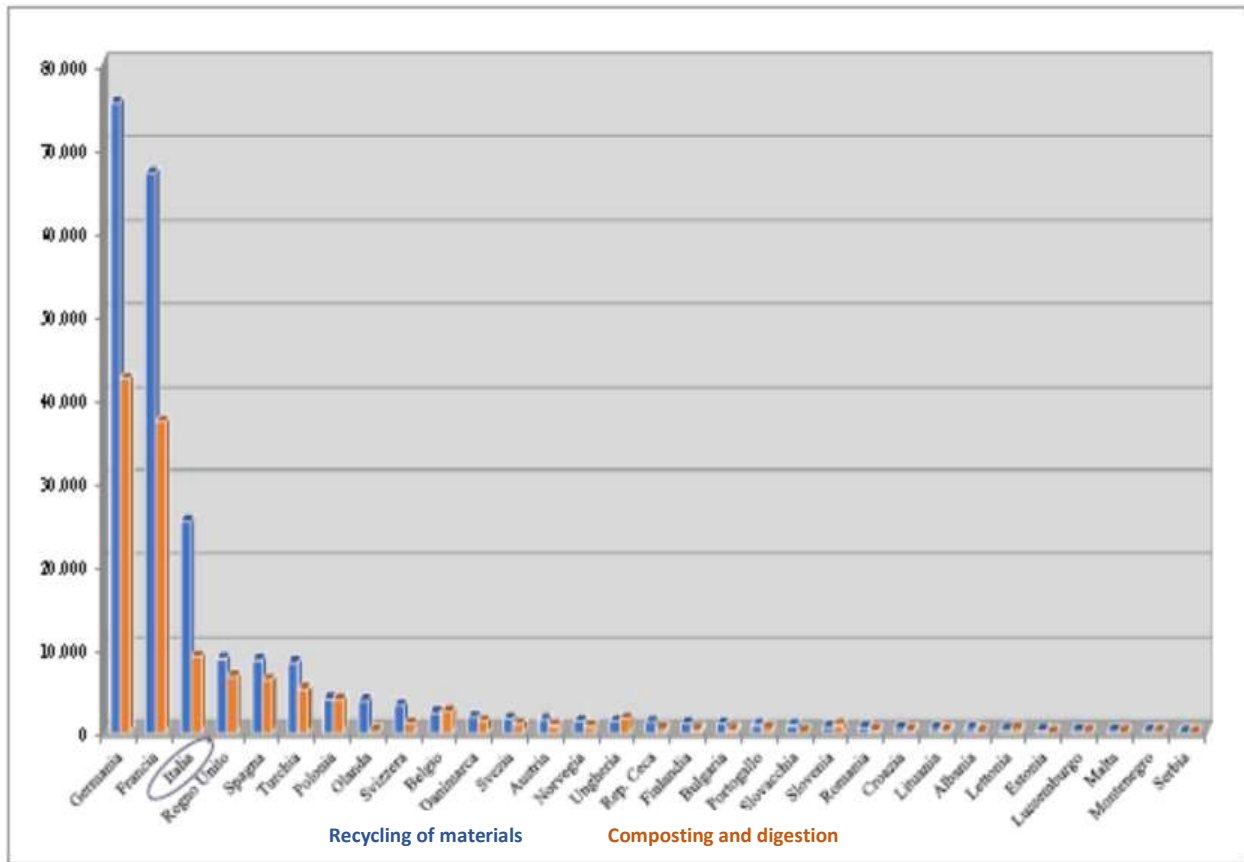


Fig. 1.2.6 Total Amount of urban solid waste going to recycling in the European area (tons x 1.000), year 2018

In 2018, about 75,4 million tonnes of urban waste were recycled in the EU-28, with a 3% increase compared to 2016 (+2 million tons). In Italy, during the three-year period, 7% increase ( 582 thousands of tons) was registered.

Finally, Figure 1.2.7 shows the amount of urban solid waste per capita intended for recycling in 2018. Germany, with a 305 kg/ha per capita value, was well above the EU average.

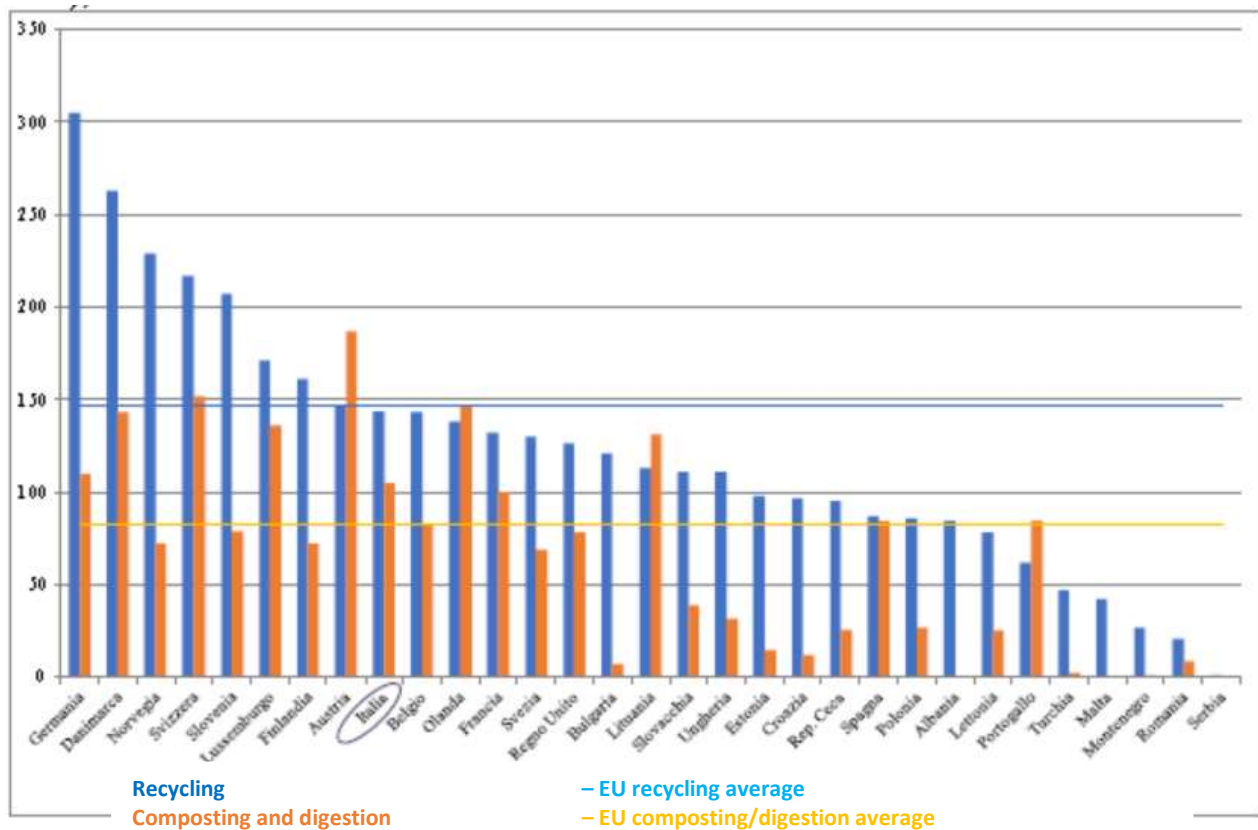


Fig. 1.2.7 Per capita amount of urban solid waste going to recycling in the European area (Kg/ha/year), year 2018

Italy, with 147 Kg/ha/per year, reflected the European average of per capita production of recycled materials while it was above the EU average (105 kg/ha/per year) in terms of waste recovery through composting and anaerobic digestion.

## 2.Solid waste disposal methods and statistics regarding them

In 2019, municipal waste disposal through landfill amounted to about 6.3 million tons and, compared to the previous 2018 survey, showed a 3.3% reduction- equal to 213 thousand tons of waste.

In the same year, separate collection reached 61,3% with a 5,2% increase. Comparing the landfill disposal rate and the percentage of separate collection over the years, it is clear that as the separate collection increases, the disposal in landfill reduces proportionately (Figure 2.1 below).

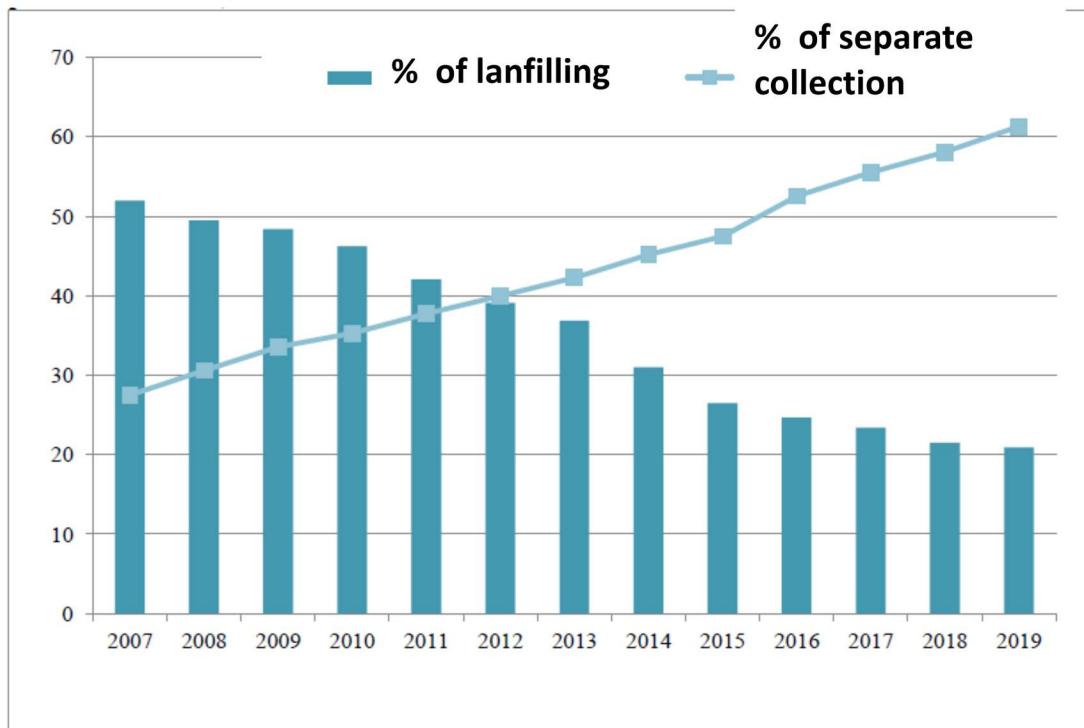


Fig. 2.1 Percentage of landfill disposal compared to the percentage of waste collection in 2007 – 2019

At regional level, the data analysis showed that the EU's objective of achieving the 10% of waste disposal in landfill (to be reached by 2035 according to the European legislation) has already been reached or is very close in several Italian Regions: Lombardy (4%), Friuli-Venezia Giulia (8%), Emilia-Romagna (9%), Trentino-Alto Adige (11%), Piemonte (12%) and Veneto (14%). On the other side, there is Sicily where unfortunately still 58% of municipal waste is disposed of through landfill.

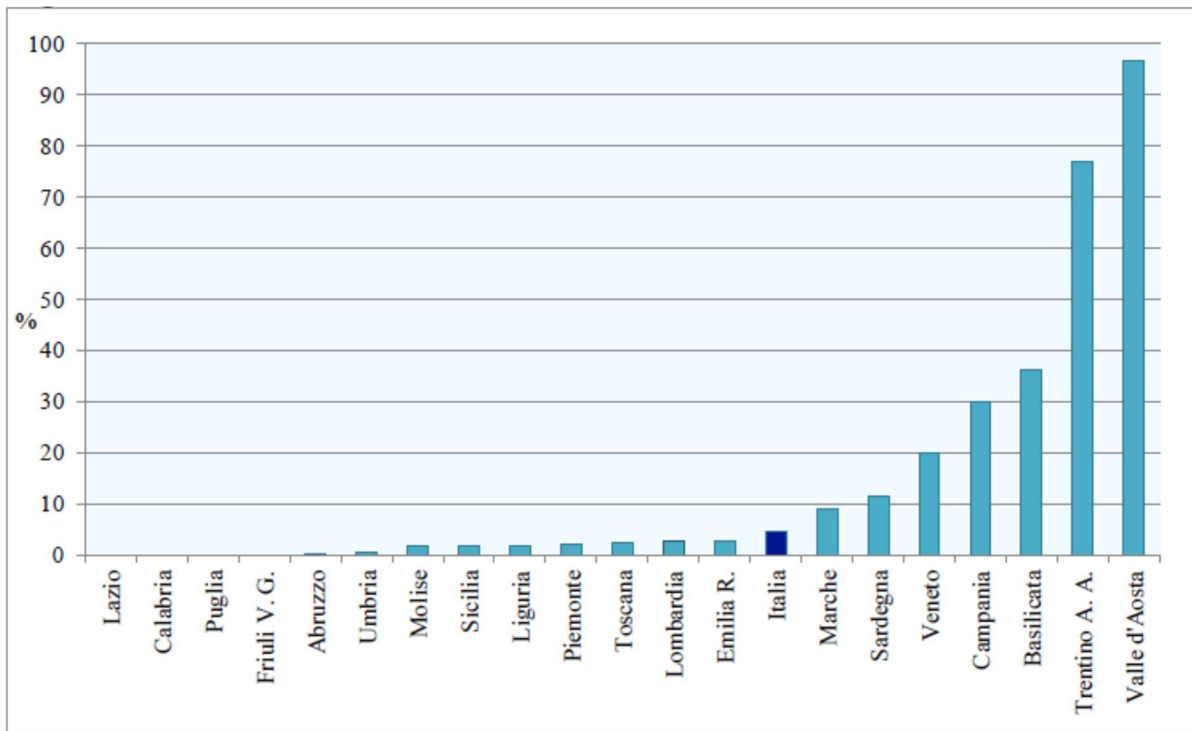
Some cases deserve a specific analysis. Because of waste streams from extra-regional areas, some regions register higher disposal rates than the actual waste produced. This is the case of the Marche Region where the waste amount from outside the region, approximately 57 thousand tons, increases the percentage of waste disposal by about 8%, compared to the total waste produced. The same was registered in Tuscany, which received 177 thousand tons of waste from outside the region.

The reduction in the disposal of municipal waste is due not only to the increase in separate collection, but also to the greater spread of pre-treatments, which contribute to processing losses, reducing the weight and volume of waste sent for disposal.

The reduction of urban solid waste disposal in a landfill depends both on separate collection's increase/growth and on development of waste treatment practices that contribute to the weight and volume reduction of waste going to disposal.

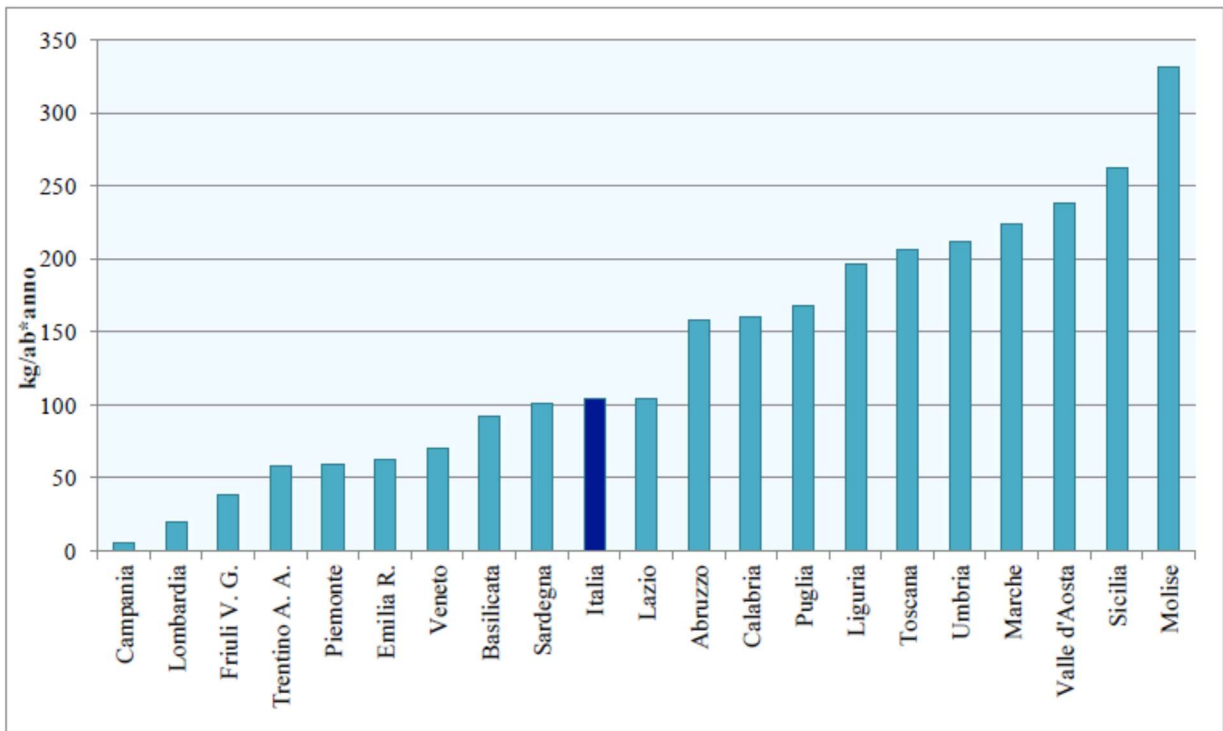
In Italy, 95,4% of landfilled urban waste is pre-treated through mechanical and biological processes.

The geographical areas analysis showed that in the North of Italy 88,7% of landfilled waste was pre-treated; in central Italy 97,3% and in the South of the country the percentage was 97%.



*Fig. 2.2 Percentage of urban waste disposal through landfill without pre-treatments for each Italian region, year 2019*

The data analysis relating to pre-treatment (Figure 2.2) in each Italian region shows that the Northern area was less virtuous than the other two areas; it should be noted that the high percentages of separate collection reached in this macro-area (69.6%) contributed to quality improvement of the residual waste destined for the dump, because this is already free of the most difficult fractions -in terms of disposal (e.g. organic fraction) as well as of those which could be recycled. In addition, final disposal in landfills in the Northern Regions, generally dealt with lower amounts of municipal waste produced than other areas of the country. The quantity of disposed waste per capita is a more suitable indicator to efficiently monitor municipal waste management. In 2019, in Italy, the disposal in the landfill per capita was 104 kg (-4 kg/inhabitant compared to 2018) showing a progressive reduction in recent years. Also the geographic macro-area analysis confirmed the positive trend in the North with 55 kg/inhabitant, South with 139 kg/inhabitant, while in the Centre, with 159 kg/inhabitant, there was an increase compared to recent years.



*Fig. 2.3 Per capita waste disposed of through landfill for each Italian regions, year 2019*

In 2019, the total amount of biodegradable municipal waste disposed of in landfill in Italy amounted to 3,769,984 tonnes, corresponding to 22.5% of the biodegradable municipal waste produced in 1995, therefore well below the EU target set for 2006, according to European legislation. The Italian legislation is very restrictive in quantitative terms and also it forecasts the optimum achievement of the objectives in terms of national context.

The national per capita biodegradable fraction landfilled was, in 2019, 63 kg per inhabitant/year, below the target set by Italian legislation for 2018.



### 3.Open-dumps data

At national level, in 2019, 131 open dump sites that disposed urban waste were registered. Most of the dumps were located in the North of the country with 54 plants, 30 in the Centre and 47 in the South; the distribution over the national territory is non-uniform.

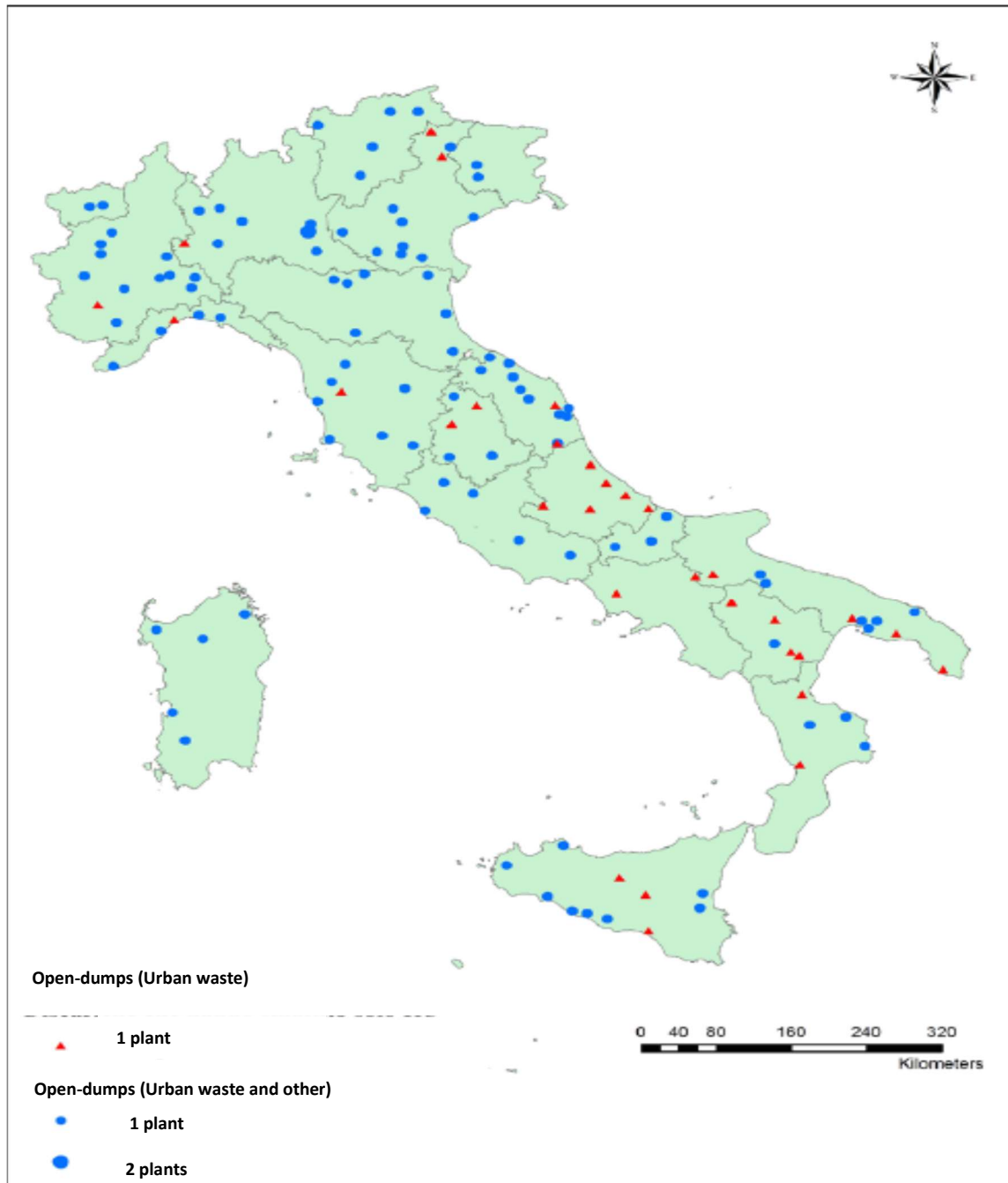


Fig. 3.1 Geographical distribution of urban solid waste open dumps / landfills in Italy, year 2019

### 3.1 Statistics, environmental and stability problems, active ones, closures, etc.

The Legislative Decree 36/2003 implementing Directive 1999/31/CE (more information in paragraph n. 6) on the building and management of landfills in Italy represented a watershed between a generic old conception of environment protection and a detailed system of control with specific legislation on the construction of landfills and waste management.

More specifically, the Decree established that all the plants had to provide the following documents (time for adjustment was given to the old plants.):

- **Operational management Plan** that includes all the technical measures and criteria adopted for the landfill and its management.
- **Post-operating management Plan** that describes the control programmes also required after landfill closure;
- **Control and monitoring Plan** that lists all the necessary measures to prevent risks of accidents caused by the functioning of the dump, in operative and post-operative phase, with special attention to prevention and protection measures of environmental matrices (air, soil, surface water and groundwater); the plan has to include parameters to be monitored and monitoring frequency;
- **Environmental Improvement/rehabilitation Plan concerning the site** after the closure of the landfill; it includes re-use, recovery and landfill diversion targets related to end use destination of the area;
- **Financial plan** that lists all the costs for the construction of the dump, the closing costs, the operational management costs, administrative costs (financial guarantees or insurance) and finally, post-closing management of costs throughout a period of 30 years, after the closure.

The need for adaptation of the old plants to the new legislation (with the risks of administrative sanctions and penalties, in case of non-compliance) resulted in the gradual closure of landfills that could not comply with the strict provisions; the number decreased from 700 dumps in 1999 to 131 in recent years.

Despite the detailed technical provisions, however, there are several areas of concern that have been only partially resolved by the new provisions (L.D 121/2020 paragraph 6).

The table below (Table 3.1.1) summarizes some of the critical elements still to be met (source: "Sustainable Landfilling" by Cossu R. and van der Sloot H.,2014, CISA publisher), concerning the construction and management of the landfill.

Critical element	Reason	Result	Environmental impact
No-indication of daily coatings quality	Lack of regulation and prescriptions	Waste Reduced permeability, perched water tables, barriers to	odour emission and mechanical instability

		the free circulation of gas.	
Sealed cover	Regulation	insufficient water input and reduction of stabilization	Lengthening of waste decomposition time
Prohibition of leachate recirculation	prescriptions	Insufficient biological stabilization	Lengthening of waste decomposition time
Inadequate materials for drainage	Regulation, lack of guidelines	inadequate drainage system / hydraulic head	Risk of leachate escaping into the environment.
Use of geotextiles to protect the draining system	Prescriptions	leachate obstruction/Accumulation of leachate	Risk of leachate escaping into the environment and odours
Lack of control of hydraulic head	Lack of regulation	Accumulation of leachate	Risk of leachate escaping into the environment and odours
Under liner drainage	Prescriptions	Diffusion of the Leachate	More risks of leachate infiltration into the soil.
Placement, protection and lifetime of geomembrane	Lack of regulation choices of the project Prescriptions	Geomembrane breaking Accumulation of leachate	More risks of leachate infiltration into the soil.
No attention to landfill morphological aspects	Authorization	Improper landscaping	Visual discomfort
Considering landfill as a low-cost solution	regulation authorizations Controls	low level of investment	Long-term environmental and economic unsustainability

*Table 3.1.1 Critical elements in the open-dumps management*

#### **4. Studies about rehabilitation of open dumps (statistics, methods, status, etc.)**

The European Court of Justice, with the judgment n. C-196/13 (2014) condemned Italy, with heavy financial penalties, for its failure to adopt the previous judgment of 2007; the judgment obliged our country to adopt specific measures, including research and studies (concerning the landfill and its mechanism) and rehabilitation of **218 open-dumps not complying with the EU legislation**; among these, 16 contained hazardous waste.

According to the Community Courts, Member States are obliged to monitor old open-dumps in order to request its closure or rehabilitation, if necessary. The open-dump seizure and the launching of a criminal judicial procedure against the manager are not sufficient measures.



*Fig. 4.1 Picture of an Open-dump*

The subject of open-dumps arose in Italy in the 80s' when in the most developed countries, environmental problems related to over-implementation of territorial, environmental and agro-food resources due to improvement of productivity and increase of manufacturing industry started. When the concept of sustainability found its basis and started to be applied, the integration of environmental requirements into national policies that had to converge with new environment and productive directives became also pivotal. This awareness was not adequately reflected in neither national legislation nor in a technologic developments; however a simplistic approach of some local authorities and their weak involvement to oppose illegal activities dominated the entire management programme.

The relevant delays and the operational and economic difficulties related to the rehabilitation of many sites (often under the responsibility of small municipalities), forced the government to take action as soon as possible. In 2017, in order to overcome management problems of **81 sites, considered the most complicated realities**, the Government appointed an **extraordinary administrator** with special powers (in the field of authorization procedures, financial capacity, open dumps rehabilitation or safeguarding, territorial coordination of local authorities etc.) who was mandated to act in the maximum transparency to ensure effective competition between economic operators involved also through reporting activities of all the interventions undertaken with semi-annual frequency.

The involved regions were 9, distributed as follows: 22 in Calabria, 14 in Campania, 13 in Abruzzo, 9 in Sicily e 1 in the Marche region (where the open-dump rehabilitation has recently ended).

The operational mandate's aim is to allow local society and environment to take back ownership of their places and sites through the following approach:

- to ensure that there is no more waste deposited in these sites;
- to classify, identify and dispose properly existing hazardous waste;
- to take all necessary measures to ensure that all the waste in the sites are disposed of without endangering human health or the environment, verifying whether the waste has already contaminated the site and assessing if safety enhancement and rehabilitation measures need to be applied.

A **successful national operational approach** based on a clear division of roles and duties to be implemented, the time limits to be observed, in order to involve all the public partner/players (Regions, Municipalities, contracting entities, scientific institution, economic actors, media partner and citizenship associations) with the common aim ***"to resolve doing well and quick"*** has been developed by the operational unit of the Carabinieri.

On 30 December 2020 the national situation was as follows:

**51 rehabilitated sites** in accordance with community regulations!!!

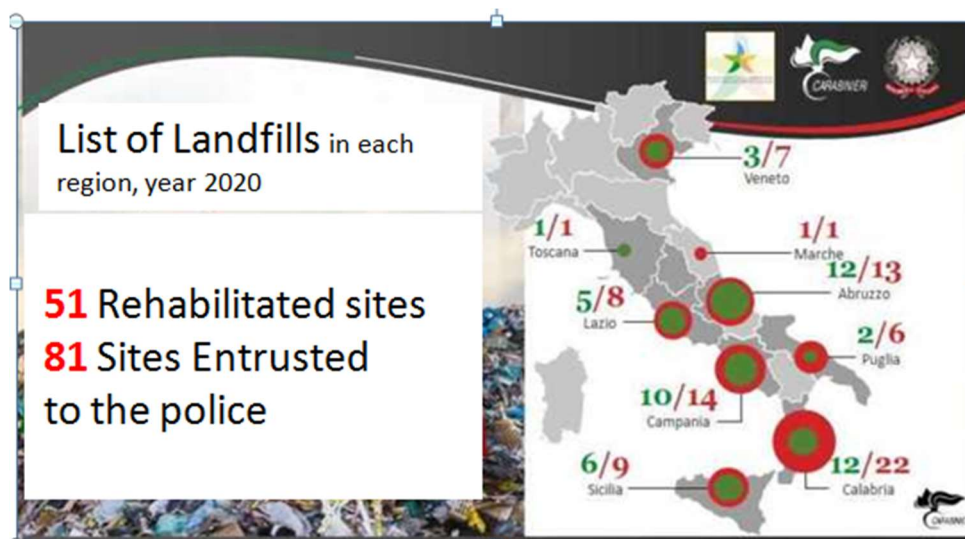


Fig 4.2 List of landfills in Italy, 2020

As the sites are rehabilitated, each activity is reported and sent to the European Commission that verifies if the site can be considered suitable to leave the infringement proceedings.

## 5. Legislations and directives about solid waste management and open dumps

The D.Lgs **36/2003** is the Italian national framework law on planning, realization, authorization and management of the landfills; this legislation set the objective of a progressive reduction in landfilling quotas of urban biodegradable waste to be widely reached at local context, in the short (173 kg/year per inhabitant by 2008), medium (115 kg/year per inhabitant by 2011) and long (81 kg/year per inhabitant by 2018) term.

Legislative Decree 36/2003 identified, as biodegradable waste, any waste that is capable of undergoing anaerobic or aerobic decomposition, such as food and garden waste, paper and paperboard.

This Legislative Decree, enacting the provisions of the Directive 99/31/CE, changed the objective of the reduction of biodegradable waste going to landfills; in fact the Directive established a target, at national level, based on reducing the landfill percentage as compared to the amount of biodegradable waste produced in 1995- setting it as benchmark year; but the national legislation, as mentioned above, set a much more restrictive target calculated on the basis of per capita disposal amount.

Applying the provisions of the Directive 99/31/CE (art. 5, comma 2), the reduction target for 2016 established that urban biodegradable waste disposed of in landfills had to be lower than 5.864.950 tonnes (35% of urban biodegradable waste produced in 1995).

The legislative Decree n. 116 (3 September 2020), entered into force on 26 September 2020, in compliance with European directives 2018/851/EU and 2018/852/EU, that were part of “Circular Economy Initiatives” and that amended respectively, the directive 2008/98/EC on **waste**, and the directive 1994/62/EC on **packaging and packaging waste**.

The mentioned Legislative Decree substantially changed part IV of the l.g n. 152/2006 - Directives covering the management of waste and the rehabilitation of polluted sites, introduced standard principles of Circular Economy and referred to the application of the new regulatory provisions to next implementing decrees, mainly in terms of extended producer responsibility.

The recent D.Lgs. **n.121/2020** modified or integrated the already mentioned D.Lgs. 36/2003 concerning:

- Admissibility/not admissibility criteria of certain waste types;
- Basic characteristics of waste suitable for disposal in landfills;
- On-the-spot examination and admission procedures;
- Landfills building and management criteria for inert, non-hazardous and hazardous waste;
- Characteristics of underground storage facilities;
- Requirements for the basic characterisation;
- Sampling and analytical methods of waste;
- Technical criteria for landfill assessment to establish, when waste treatment is not necessary for the purpose of disposal.

The Ministry's Decree of 27 September 2010 on the Environment- "*Definition of waste eligibility criteria in landfill*" - has been repealed as a consequence of D.Lgs. 121/2020, even if some of these provisions will continue to be applied until 1 January 2024.

## **6.Target Groups - Identification of them, how this project will contribute them better, what should be done to include more of them, etc., your proposal of the best strategy**

Solid Waste Management requires a group of highly qualified professionals who possess specific competences, knowledge and expertise in this field; in fact the staff will work in order to offer comprehensive solutions to the problem of waste landfill at national and European level. To reach this goal, professionals must increase the level of their competences and skills through an innovative learning approach. The list of beneficiaries and target groups that will be involved in the project:

- Decision-makers of municipalities and local authorities involved in waste disposal and management
- Engineers working in the municipality
- Technical staff committed in environment protection at local level (various organizations and local bodies)
- Private sector representatives working in the field and interested to the dumps rehabilitation and waste management.

## **7.Dissemination - Type of dissemination activities, possible associated partners, involvement of associated partners, how to get associated partners to involve more, etc., your dissemination plan**

The dissemination activities for SMARTEnvi project will include several types of interventions to raise awareness on waste disposal issue and to involve as much as possible professionals and stakeholders of the sector. The project team will be committed to the promotion of information and the sharing of materials for the whole duration of the project to support the achievement of project goals. The dissemination materials that we will use and the activities that will be implemented are listed below:

1. Digital material (short news on website or dedicated pages, dedicated e-mails; PPT presentations) and printed material (dissemination leaflets and newsletters);
2. Online dissemination channels (websites; social media);
3. Dissemination events in presence (on line meetings, seminars, conferences, webinars, multiplier event, transnational meeting);



4. Dissemination targets (target groups, local authorities, civil society, local citizens, non-governmental organisations, local citizens' groups, trade unions, local traders' associations and youth organisations).

## 8. Conclusions and recommendations

As a conclusion in relation to the SMARTenvi project the following can be stated:

1. **Waste management**, in the Italian and European context, **is affected by preconceptions**: e.g. the widespread practice of considering some systems of waste collection, treatment and disposal as better or worse than others. It is necessary, therefore, to understand that every system has its specific and optimum scope of implementation and that only integrated solutions can solve the problem of waste management.
2. The concept of “controlled landfill” is obsolete and useless, when associated with virtuous collection and treatment systems. This does not fully reflect the real situation notably as regards to residual waste treatment and waste recycling that the “*Circular Economy*” produces; for this kind of waste, **a “sustainable” landfill, today and in the near future, can play a key role in supporting the back-end of the material cycle.**
3. **Moving from “controlled” landfill to “environmentally sustainable” landfill necessarily implies a change of the approach at several levels**; mainly at political and regulatory level to ensure adequate technical and qualitative standards to be applied to the landfills: these standards have to take into account the unavoidable changing of waste types over time and their long term-impact in terms of contaminating emissions.
4. **An “environmentally sustainable” landfill management must include substantial investments in** scientific researches, new technologies, various structures etc... These features, therefore, are limited and totally charged to managers that sense them as obstacles to their personal gain. Investing constantly in the landfill can create more economic and employment opportunities at local level but also ensure the final quality of the plant, measurable and recognised by the Authority; this relieves the manager of possibilities and responsibilities of environmental damages, protecting managers, inhabitants and all the environment nearby.
5. According to the latest scientific and accredited studies, clear linkages between impacts on health and toxic waste landfills exist, **while up to today, no epidemiological study is able to show a relevant correlation between various types of pathologies and landfills for urban solid waste and non- hazardous waste.** This data is even more relevant, if we consider the

fact that the realization and management of landfills have never been oriented towards an environmental sustainability perspective.

6. **There is a discrete variety of future possible uses of these areas- previously characterized by landfills-** that are functional and compatible with technical and regulatory aspects related to the post-management and monitoring of environmental parameters. These uses can improve local residents' life; there is a need to consider this, during planning time of the landfill, in order to avoid the risk of dramatically reducing any opportunities and choices in the future.

## 9.References

Cossu R., van der Sloot H., 2014. Sustainable Landfilling, first ed. CISA Publisher, Padua