

Incinerators in Italy: an overview in the light of the Circular Economy model

Abstract

UK

In the Circular Economy paradigm, waste management is recognised as an important sub-sector of circular economy which allows recovery of resources and environmental impact prevention. In Italy incineration of Municipal Solid Waste (MSW) still counts for 18%. On one hand, knowledge and information on waste flows and technological features of plants (pre-treatment and treatment plants, composting plants, incinerators and landfill) is known. On the other hand, information and studies on economic aspects of such plants are limited. Due to the regulation of the sector, one of the relevant economic indicators of the incinerators are the fees to access to these plants (“gate fees”). This study frames the waste management sector within the Italian legislative structure. Furthermore, it aims at partially close the gap in literature regarding the gate fees of incinerators. Results show that the gate fees are not uniform, and they range between 64 Euro tonne (Napoli in Campania region) to 112 Euro tonne (Padova in Veneto region). This research is also relevant considering the new born regulatory and control authority (ARERA) which includes since January 2018 the waste management sector.

IT

Nel paradigma dell'economia circolare, la gestione dei rifiuti è riconosciuta come un importante sotto-settore dell'economia circolare che consente il recupero delle risorse e la prevenzione dell'impatto ambientale. In Italia l'incenerimento dei rifiuti solidi urbani (RSU) conta ancora per il 18%. Da un lato sono noti i flussi di rifiuti e le caratteristiche tecnologiche degli impianti (di pre-trattamento e trattamento, impianti di compostaggio, inceneritori e discariche). D'altro canto, le informazioni e gli studi sugli aspetti economici di tali impianti sono limitati. A causa della regolamentazione del settore, uno degli indicatori economici rilevanti degli inceneritori sono le tariffe per l'accesso a questi impianti (dette "gate fees"). Questo studio inquadra il settore della gestione dei rifiuti all'interno della struttura legislativa italiana. Inoltre, mira a colmare parzialmente il divario nella letteratura riguardante le tasse di accesso agli inceneritori. I risultati mostrano che le “gate fees” non sono uniformi e variano tra 64 euro di Napoli (in Campania) a 112 euro a tonnellata di Padova (in Veneto). Questa ricerca è anche rilevante considerando la nuova autorità di regolamentazione e controllo (ARERA) che dal gennaio 2018 include il settore della gestione dei rifiuti.

Keywords:

ENG: circular economy, incinerator, gate fee, recovery, recycling, waste management.

IT: Economia circolare, inceneritori, tariffe di accesso agli impianti, recupero, riciclo, gestione dei rifiuti.

1. Introduction

Incineration with energy recovery still plays an important role when the other preferred options are not available following the 3R principle (Reduce, Reuse and Recycle). In Italy, approximately 26% of municipal solid waste (MSW) is sent to material recycling, 19% to organic recycling (from separated collection), 18% to incineration while 25% is still landfilled (ISPRA, 2017). Nevertheless, often disposal operations come after mechanical biological treatment (MBT) which makes it difficult to identify the several waste management activities. In Italy MBT is mainly a pre-treatment of waste which ends up in landfill (55%), incinerators (22%), while less than 2% is recovered material. Despite the “think tank” which aims for the zero-waste paradigm, available data confirms that in Europe incineration of waste accounts for 30-60% (Massarutto, 2015). Disposal and landfill are reduced where an integrated waste management system is performed.

Our analysis on thermal treatment of solid waste is needed due to the relevance of the topic and to the economic impact of the treatment phase on the total waste management costs. This research aims at filling a gap in literature where there is lack of shared knowledge and authoritative, up-to-date and homogenous information on the incineration phase (Hogg, 2015).

The total financial costs of waste incineration include investment costs and operating costs. Potential revenues from recovered material, energy and heat are deducted from the total costs defining the net cost. Three approaches can be used to quantify investment and operational costs: 1) “engineering approach” based on a desktop study used to design a standard facility; 2) “operating facilities approach” based on the data collected on the field and 3) “gate fee approach” based on the fees paid to the waste management facilities by the users (Massarutto, 2015). Our study adopts the third model, knowing that it can present some disadvantages such as the financial costs might be different from the “gate fees”. This decision is supported by other relevant studies undertaken by the European Union which estimated the “gate fees” since data on the costs of different options is typically not available in any other form. The gate fee is the amount that the local authority pays to the service provider and it is usually expressed in €/tonne (Hogg, 2005).

The Italian Regional administrations adopt heterogenous approach in setting the fees for the treatment and disposal plants. Therefore, an inquiry which starts from the “gates fees” of the several national plants have different purposes: 1) publicize information in a systematic way; 2) create benchmarks inspired by the Portuguese model called “sunshine regulation”; 3) promote efficiency; 4) highlight application of fees that significantly differ from the benchmark practices. The sunshine regulation applied by the Portuguese Government had the purpose to supervise and improve the quality service in the urban waste utilities by publishing and comparing a set of performance indicators. Such regulatory strategy aims at becoming an effective tool to trigger competition between operators (Marques and Simoes, 2008). Our study presents an overview of the approved treatment and disposal fees followed by a detailed analysis of fees and their components applied to some incineration plants.

In Italy, in January 2018 ARERA has been established from the enlargement of the powers of the old Authority AEEGSI. This is the national operating and independent authority which regulates also the waste management sector together with energy, gas and water sectors. The Antitrust authority suggests setting up a technical regulation model and criteria which define the “gate fees” of the treatment plants by an appointed authority (AGCM, 2016). But which are the principles and methods, and which are the experiences to develop this model and these fee rules? The Antitrust Authority expects a reduced use of landfill disposal (AGCM, 2016). Nevertheless, first it should be clearly defined the boundary between recovery and disposal. Additionally, the minimum level of recovery rate should be set. Underneath this minimum recovery rate, the treatment activity becomes pre-treatment activity on waste disposal.

Last, it is necessary to foster the industrial development of the sector, make the service more transparent, empower the actors involved to build an “homogeneous system across the national territory, which ensures adequate levels of quality in terms of efficiency and cost-effectiveness of the administration, by harmonizing the economic-financial goals with the general social and environmental goals” as requested by the Budget law 2018 (law n. 205 of 27 December 2017). This seems an ambitious goal if we consider the actual unclear and patchy situation. Our study aims at shedding some light in this complicated and fuzzy field.

1.1 Legislation framework

The regulatory framework is one of the factors which influence the gate fees and the persistence of cost differentiation across Europe (Hogg, 2005). For this reason, this section presents the Italian legislation framework. In Italy, the markets of certain Public Utilities (PU) are regulated by the Competition Authority and the Regulatory Authority. The two bodies have different functions. The main goal of the Competition Authority is “to repress unfair commercial practices, misleading and unlawful comparative advertising and the application of conflict of interest laws to government-office holders”. The Competition Authority (Autorita’ Garante della Concorrenza e del Mercato AGCM) is an independent public agency established by Law n. 287/1990 which introduces antitrust rules.

The main purpose of the new Regulatory Authority (Regulatory Authority for Energy, Networks and Environment ARERA), on the other hand, is to promote the competition 1. “in the market” (promoting the competition among existing operators and removing potential barriers) 2. “for the market” (promoting the potential competition by setting the selection rules). Potentially, this authority could also provide preventive opinions on the “in-house contracts”. Additionally, the regulatory body should set the rules of the portion of market which remains out of competition (monopoly) to guarantee the quality of the service, to define the structure of the tariffs and the contractual agreements as well as verify the results of the management operators (Merusi and Antoniazzi, 2017).

The Regulatory Authority was established in 1995 by law n. 481 for public utility services, namely electricity and gas. Since 2011, according to law n. 11, it includes water services (AEEGSI). In December 2017 law n. 205 (Budget law) art. 1 paragraph 527-530, created the new Regulatory Authority for Energy, Networks and Environment (ARERA) from the ashes of the old Energy, Gas and Water Authority (AEEGSI) with the aim at including regulatory functions also on the waste sector. ARERA has regulatory and control functions to guarantee competition and efficiency, ensure accessibility, usability and homogeneous distribution of the waste management services on the national territory, guarantee adequate levels of quality, efficiency and cost-effectiveness of the waste management services. The Authority aims at improving the waste management infrastructure to achieve the goals imposed by the European legislation and avoid infringement sanctions. ARERA defines, among others: directives to separate the accounting of each individual services (unbundling); service quality levels; standard contract schemes for waste management services; tariff method to apply to the integrated waste services; criteria to set the “gate fees” for treatment plants. Therefore, according to art. 527 of the budget law 2018 (letter g) the Authority has regulatory and control functions in setting the criteria to define the access tariffs to treatment facilities.

ARERA also approves the service rates defined by the local authorities for water and waste services (ATO). The waste management companies pay a contribution to finance the functioning of the Authority. The maximum amount of the contribution is 0.1% of their last annual revenues.

ARERA with its first resolution (1/2018/A) among other, decided to carry out a document describing the situation of the waste sector in Italy, its subdivision in individual activities, as well as mapping the operators and stakeholders involved.

The situation in Italy regarding the gate fees of the treatment plants for unsorted municipal waste, ranges from two opposite situations. On one end, there is the free market model adopted by the Lombardia Region where the treatment plants agree the gate fee directly with the counterpart. On the other end, the Emilia Romagna Region has regulated the gate fee for private and public treatment plants dealing with MSW under the supervision of a regulatory authority (ATERSIR).

The national legislation provides limited indication on the gate fees of the treatment plants (landfill, incinerator and MBT plant). Article 25 of the “deregulation decree” (Decree Law 1/2012 converted to Law n. 27/2012) reports: “the waste management service company (where the owner of the plants is not the local authority) must be granted the access to the plants at regulated and predetermined fees”.

In addition, to fulfil the Proximity Principle, the National regulation has stipulated the Regional self-sufficient principle (EC, 2015). According to art. 182 decree law 152/2006 amended by Decree 205/10, “It is forbidden to dispose of non-hazardous MSW in different Region than those where such waste was produced unless the case of regional or international agreements, if the territorial factors and technical/economic possibilities to achieve optimized levels of served population so require”. However, it is unclear if the proximity principle applies or not to pre-treated waste (which is classified as special waste) and to incinerators (classified as R1 i.e. recovery operation excluding disposal) (EC, 2015). The prevailing interpretation is that pre-treated waste is out of the scope while all plants (including incinerators classified as R1) are in the scope. The Italian Government superseded the proximity principle adopting a Decree n. 133/14 of 2014 converted to Law n. 164/2014 called “unlock Italy” which sets a national network of incinerators classified as R1 which can be used for national needs. Art. 35 of Decree n. 133/2014 specifies that the regional administration fixes a compensation fee (max 20 Euro/tonne) that the local incinerators must pay to the regional administration (or province administration in case of Trento and Bolzano) to compensate for the treatment of the MSW coming from another region. Article 35 has, de facto, redefined the “principle of self-sufficiency” i.e. moving it from a regional level to the national level for unsorted waste treated in energy recovery plants. Nevertheless, waste produced in the same region where the plant is located, holds the priority.

The gate fee (for incinerators and landfills) for MSW is an important indicator or signal which leads operators (waste management operators as well as end users). At the same time, it sets the conditions to fill the gaps in terms of plant infrastructures, minimize negative externalities as well as the use of landfill (Ref, 2015). Nevertheless, so far there are no guidelines for the definition of the gate fees and information on the applied gate fees is limited. At European level, there is a clear need to understand the costs of waste management in general (including incinerators’ gate fees) as declared in the final report to the Directorate General Environment of the European Commission (Hogg, 2015) This research partially fills the gap in mapping the current situation regarding the gate fees applied by the incinerator plants and this is even more important considering the regulatory powers of the new authority which includes the waste management field.

2. Technical overview

2.1 Municipal Solid Waste in Italy: production and management

The Italian legislation (Legislative decree n. 152/2006 art. 184), defines two categories of waste based on their origin: municipal solid waste (MSW) and special waste. MSW includes household waste, waste produced by schools and institutions and small commercial business, as well as waste from street sweeping and waste lying in the public places. MSW is managed by the public services and financed by taxes. Special waste instead, comes from production activities and from waste processing regardless of their content and quality. This category is managed by waste management companies and the prices are set in the free market. Moreover, special waste is classified in hazardous and not hazardous waste according to the product categories identified by the European Waste Catalogue (CER). Hazardous waste must be treated by authorized plants. No-hazardous waste, on the other hand, can be compared and treated together with MSW based on its quantity and quality. The Ministry for the Environment, Land and Sea protection should have identified national uniform and univocal criteria for this comparison. However, so far, the Ministry has not issued any implementation decree. Therefore, based on decree 152/2006 (art. 198 paragraph 2 letter g), this competence remains on each municipality. Local administration is still in charge of issuing a regulation to define quantity and quality of special waste which can be assimilated to MSW.

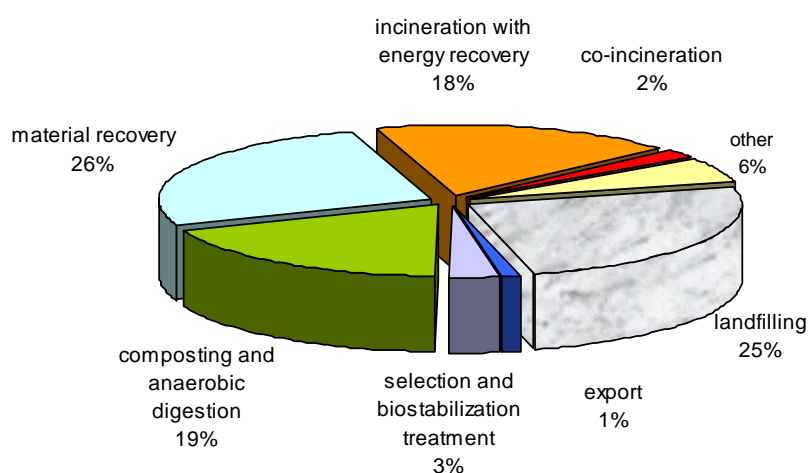
This “analogy” is important for several reasons. First, it is relevant in terms of control as MSW are subject to more strict traceability requirements. Second, the “analogy” helps achieving the separated

waste collection goals. Third, according to a survey by Ref based on the economic-financial budgets of the Italian provincial capital cities, on average 45% the costs of MSW collection and disposal is supported by non-domestic users which waste is compared to MSW (Ref, 2017).

One important issue, as reported above, is the “transformation” of waste out of the mechanical pre-treatment of MSW which becomes “special waste” and therefore it is out of the MSW organisation and rules. Only pre-treatment to landfill disposal is made compulsory by the Landfill Directive 99/31 enforced by Decree 36/3 (EC, 2015). For this reason, the regional administration of Veneto in 2017 has prohibited this waste switch with the decree n. 445.

In Italy in 2016 MSW production was 30.1 million tonnes, 10.8 million (36%) managed with MBT (Mechanical Biological Treatment) which allows the recovery of mixed waste as well as the treatment of the biological component of waste. This important portion of waste eventually ends up in landfill (55%), incinerator (22%), productive plant (5%) and less than 3% produces recovered materials. Figure 1 shows the percentage of waste managed by the final treatment plants.

Figure 1: Municipal solid waste in Italy in 2016 – production and management
Source: ISPRA 2017



The redefined “principle of self-sufficiency” which allows to treat unsorted waste in energy recovery plants placed in another region, and aims at making Italy self-sufficient on waste treatment, has been used only in few occasions for MSW, while it is normally used for “special waste” (EC, 2015).

2.2 Waste treatment plants in Italy

In Italy, the waste treatment plants were 631 in 2016 and 617 in 2015. See Table n. 1 for details.

Table 1: Number of waste treatment plants in Italy 2016 and 2015

year	Landfill		Incineration		MTB		Composting and anaerobic digestion		Total	
	2016	2015	2016	2015	2017	2016	2016	2015	2016	2015
North	53	65	26	26	42	36	213	202	334	329
Centre	31	34	8	8	36	32	44	44	119	118
South	50	50	7	7	52	50	69	63	178	170
ITALY	134	149	41	41	130	118	326	309	631	617

Source: ISPRA 2016, 2017

In 2016, in Italy there were 305 plants to treat the mixed MSW (in 2015 were 308): 44% landfills, 13% incinerators and 43% MTB plants.

It is crucial that at least landfills, incinerators and MTB plants have regulated gate fee, while composting and anaerobic digestion plants that treat the organic waste fraction should be carefully monitored.

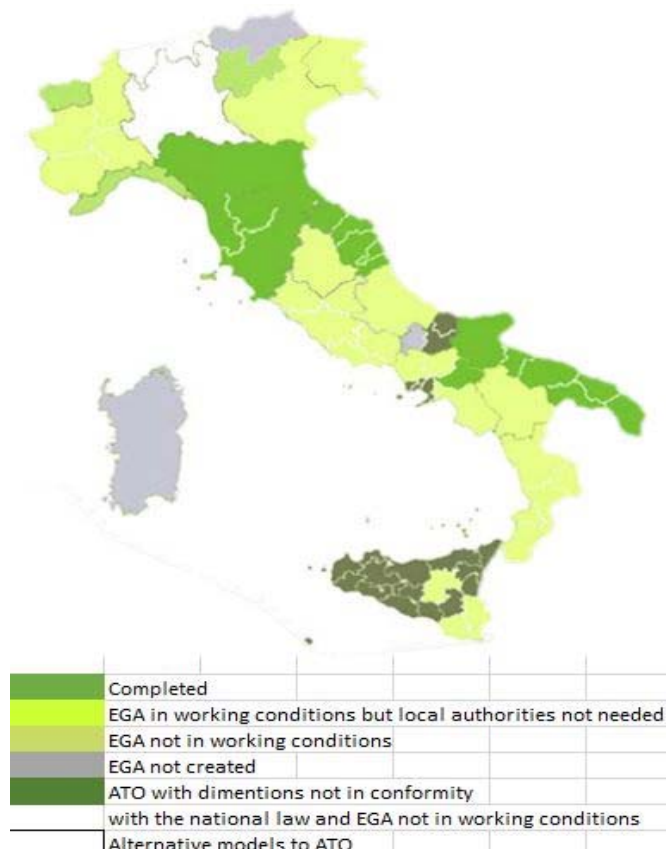
2.3 Local organisation for the management of MSW

Based on art. 3 bis of Decree Law n.138/2011, MSW organisation must be managed by the regional administrations and by the two autonomous provinces of Trento and Bolzano. According to Invitalia (2016), there are currently 81 ATOs (optimal territorial areas).

These ATOs create a heterogeneous organisation at the national level: 7 ATOs match the regional territory, 40 ATOs match the province territory, while 28 ATOs cover only part of a province (sub-provincial) and 6 ATOs cover more than the provincial territory or even more provinces (over-provincial).

Piemonte with regional law n. 1/2018 defines one ATO which covers the regional territory for the functions related to construction and management of disposal plants, while for collecting waste there will be ATO corresponding with the provincial territory.

Figure 2: Governance structure
 EGA: Government bodies of ATO
 Source: REF, 2017



3. Gate fees: several cases in Italy and Europe

3.1 Regional cases of Gate fees: regulation and free market

As mentioned in the introduction, the regional cases range from the free market solution (adopted by Lombardia region) to the regulation solution (Emilia Romagna region).

Based on the “deregulation decree”, the Emilia Romagna regional administration adopted the regional law n. 23/2011 (and its application decrees) which defines the “gate fees” of all public and private MSW treatment plans. More precisely, in art.16 of law n. 23/2011, the regional administration defines the criteria which include/exclude the costs/revenues and defines the gate fee. The regulation framework is managed by the regional authority ATERSIR. The gate fee is defined for the economic compensation of the disposal of MSW which includes: operational costs plus capital costs, minus revenues from heat energy, electrical energy, waste incineration and economic incentives for renewable energy according to the following formula:

$$CS_U = (CO + CK) \times k_{CO,CK} - (R_{ET} + R_{EE}) \times k_{ET,EE} - R_{RI} \times k_{RI} - R_{IFR} \times k_{IFR}$$

CO= total operational costs of the plant

CK= cost of capital use (including depreciation, provisions, cost of debt capital, cost of risk capital

R_{ET}=total revenues from selling the thermic energy

R_{EE}=total revenues from selling electrical energy

R_{RI}=total revenues from recovery of waste from incineration from the disposal plant

R_{IFR}=total revenues from net incentive from renewable sources of the disposal plant

One main issue in terms of accounting, is related to the treatment plants which treats MSW (where the revenues are regulated) and special waste: the split in two categories of waste depends – as reported above - on their origin not on their content.

Table 2: Gate fees for the Emilia Romagna’s plants - year 2018

<i>Plants in the ATO</i>	<i>Gate fees EUR/tonne 2018</i>
Piacenza-INC	114.00
Parma-TM (<i>IREN</i>)	126.00
Parma-MBT (<i>OPPI</i>)	136.55
Reggio Emilia-TM (<i>SABAR</i>)	117.73
Modena-MBT (<i>AIMAG</i>)	185.00
Bologna-TM (<i>COSEA</i>)	159.00
Modena-INC	113.00
Bologna-INC	
Bologna-MBT (<i>AKRON</i>)	
Ferrara-INC	
Ravenna-TMB (<i>HERAMB</i>)	
Forli Cesena-INC	
Rimini-INC	
AVERAGE	117.00

INC: incinerator; MBT: mechanical biological treatment; TM: mechanical treatment

In brackets the name of the managing company

Source: ATERSIR Resolution n. 92/2017 - Regulation of MSW disposal service for the year 2018

Piemonte regional administration delegated the regulation of the “gate fees” to the provinces (regional law n. 24/2002). The regional law n. 1/2018 defines one ATO which covers the regional territory for the functions related to construction and management of complex technology plants, meaning the waste-to-energy plants, the organic waste treatment plants, the treatment plants of the residual fraction, waste-derived fuel production plants, and landfills, even if in post-closure period.

In Lombardia region, the treatment plants operate in the free market and no gate fees are defined. The regional law n. 26/2003 has been partially abrogated in 2009 and 2015. Therefore, the few provinces that once determined a maximum gate fee, are not anymore in charge.

In Veneto region, the treatment plants are authorized by the province or the region administration and they also define the “gate fees”. More precisely, regional law n. 3/2000 includes the “gate fee” as part of the treatment plant project which needs to be approved by the administration. In this specific regional case, an application decree (n. 445/2017) defines that waste produced after the mechanical pre-treatment of MSW, do not become “special waste” (which is out of the MSW organisation and rules).

The rate for the allocation of MSW to disposal and recovery facilities, already governed by the regional law 33/1985, is calculated based on a financial plan formulated by the management company consisting of two factors:

1. industrial cost, in relation to:
 - 1.1 costs related to investment for the construction of the plant, including financial charges and costs related to the implementation of environmental mitigation works;
 - 1.2. operational management costs, including those relating to personnel and work equipment used;
 - 1.3. general and technical costs and business expenses;
 - 1.4. expenses for the de-commissioning of plants and, for landfill sites, expenses foreseen for the environmental reallocation and for the management of the post-closure period;
2. taxes in the extent determined by the applicable laws.

Veneto region for example with the regional deliberation n. 955/2015 approved a gate fee for the Padova incineration plant of 121.07 Euro/tonne. This fee includes a contribution to Padova municipality of 8.20 Euro/tonne, while VAT and taxes are excluded.

3.2 Gate fees comparison in Italy: Padova and Bolzano

After the overview of the approved treatment and disposal fees, this paragraph presents a detailed analysis of gate fees and their components applied to some incineration plants. The gate fee is defined by the European Commission (2012) as a charge set by the operator of the incinerator for the provision of the service. This is computed as the total costs minus total revenues. On the other hand, the total gate fee includes also the tax paid to the local administration.

Often the gate fees of waste to energy plants change every year. The two incineration plants of Padova and Bolzano considered in this paragraph, have kept the same gate fee in the last three years. Therefore, their costs and revenues expressed in Euro/tonne can represent a reference point, even if some consideration needs to be made. In the case of Padova, the gate fees in theory are computed every year in advance. However, the gate fee applied in 2018 is the same as the one applied in 2015. In the other hand, the case of Bolzano, the Provincial Council presented a detailed budget in 2014 for the following 25 years with a fixed gate fee for MSW of 81 Euro/tonne including the compensation to the council. The first Alto Adige Resolution n.586/2014, defined a compensation to the council equal to 4% of the gate fee while this compensation was increased to 6% in 2017. The incinerator can treat up to 130,000 tonnes per year. Our computation defined the costs and revenues per tonne based on the budget, the fixed gate fee of 81 euro/tonne, and the compensation to the council. Therefore, the hypothetical quantity to be treated in 2018 is 124,200 tonnes of MSW.

Figure 3: Industrial tariff of Padova incineration plant, year 2018, 181,300 treated tonnes
 Source: Resolution of the Veneto Regional Council n. 955/2015

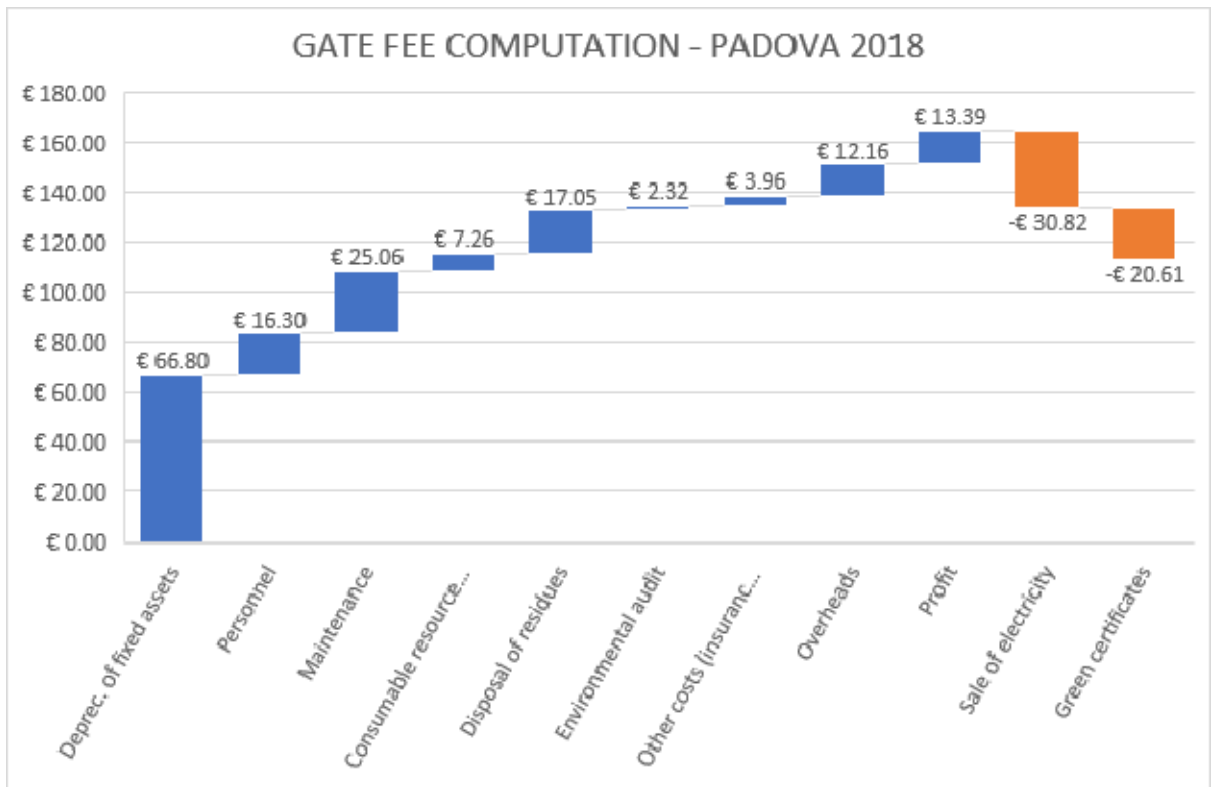
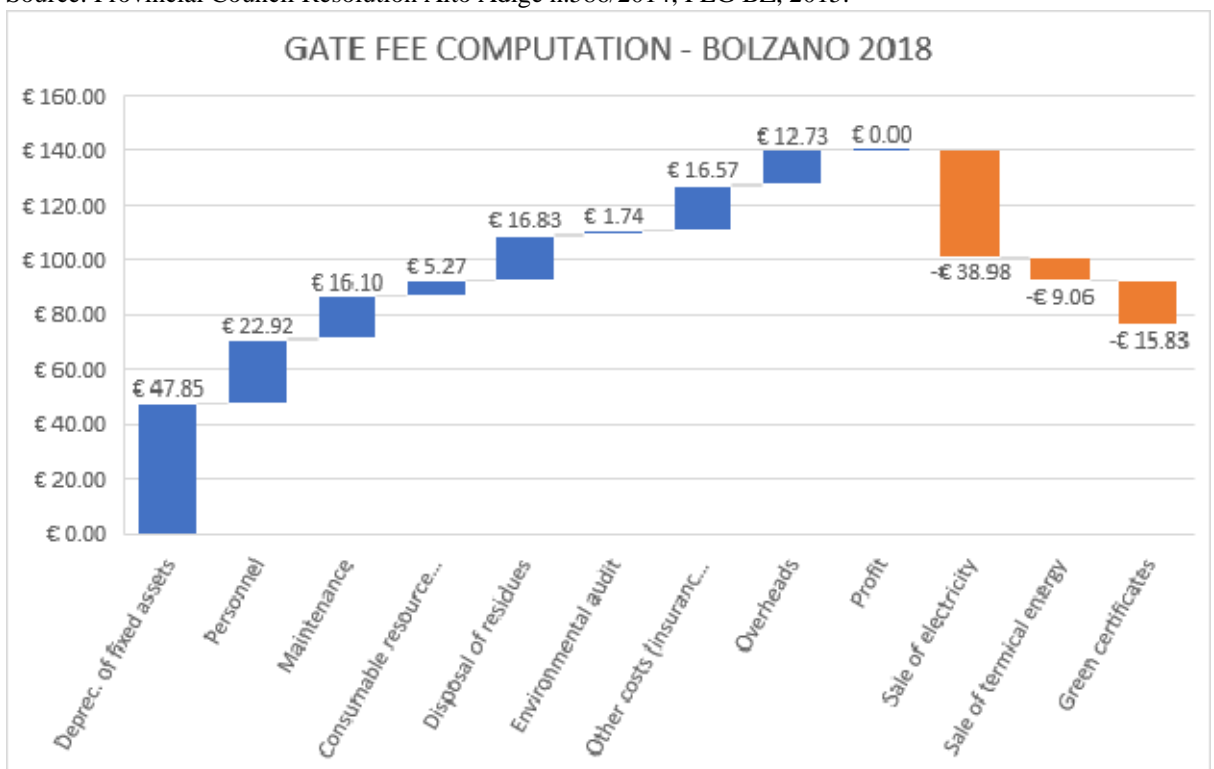


Figure 4: Industrial tariff of Bolzano incineration plants, year 2018, 124,200 treated tonnes
 Source: Provincial Council Resolution Alto Adige n.586/2014; PEG BZ, 2015.



In the cases of Padova and Bolzano, the gate fees are quite different: 112.87 Euro/tonne in Padova and 76.14 in Bolzano. The main difference in gate fees, is due to the higher depreciation costs computed for Padova. Bolzano has a nearly new incinerator (built in year 2013) while Padova has three production lines: two old lines have been revamped and a third production line was built in 2011. Furthermore, Padova includes a profit of 13.39 Euro/tonne while Bolzano contemplated in the budget a quite high value of electricity sales. The total gate fees are computed based on the gate fees plus the compensations to the local municipality, province or regional administration. In the case of Padova the contribute to the council is 8.20 Euro/tonne while for Bolzano is 4.86 Euro/tonne.

In table 3 we present the incinerators capacity and fee in different Italian regions.

Table 3: Incinerators – capacity and fee

Incinerator	recovery status	Capacity* tonne/year	Gate fee Euro/tonne	Contribution to municipality Euro/tonne	Contribution to province/ATO Euro/tonne	Tot Gate fee Euro/tonne
Alto Adige BZ	R1	130,000	76.14 ^a	4.86	29.69	110.69
Lombardia BS	R1	981,837	87.72 ^b	-	-	87.72
Piemonte TO	R1	526,500	105.89 ^c	2.50	3.50	111.89
Emilia Romagna BO	R1	220,000	112.06 ^d	8.94	-	121.00
Emilia Romagna PC	R1	120,000	109.00 ^d	10.00	-	119.00
Emilia Romagna MO	R1	180,000	112.67 ^d	8.33	-	121.00
Emilia Romagna PR	R1	130,000	119.00 ^d	11.00	-	130.00
Veneto VI	R1	82,000	109.00 ^e	-	-	109.00
Veneto PD	R1	170,000	112.87 ^f	8.20	4.00	125.07
Campania NA	R1	600,000	64.68 ^g	4.12	54.26	123.06
Toscana AR	R1	42,000	91.00 ^h	7.00	-	98.00
Toscana SI	R1	70,000	83.00 ^h	7.00	-	90.00
Average			98.59			

VAT rates excluded

BZ: Bolzano; BS: Brescia; TO: Torino; BO: Bologna; PC: Piacenza; MO: Modena; PR: Parma; VI: Vicenza; PD: Padova; NA: Napoli; SI: Siena; AR: Arezzo.

Sources:

**DPCM Decree President of the council of the ministers 10.08.2016 Appendices I – Authorized treatment capacity*

(a) Provincial Council Resolution Alto Adige n.586/2014, n.1031/2016

(b) Decree of President of Brescia Province n. 87/2016 - Maximum price year 2015

(c) Resolution ATO Torino n. 4/2016

(d) Resolution ATERSIR n.56/2016; Regulation of MSW disposal service for the year 2016

(e) Free market

(f) Resolution of the Veneto Regional Council n. 955/2015.

(g) Decree of Campania management n.36/2015 confirmed by Council of State; Resolution by the Metropolitan Mayor of Napoli n. 95/2016

(h) Deliberation of the General Director of the ATO Authority of Toscana South n. 8/2018 and Resolution of the Assembly of the ATO Community n. 22/2010

In general terms, there are several factors affecting the costs of incineration plants which are reflected in the gate fees: cost of land acquisition, plant scale, plant utilisation rate, treatment and disposal/recovery of ash residues, efficiency of energy recovery and the revenue received for energy delivered, recovery of metals and its revenue, and taxes on incineration (Hogg, 2005).

The market conditions and the regulation in force can affect the abovementioned factors, resulting in differentiated gate fees between Member States and regions.

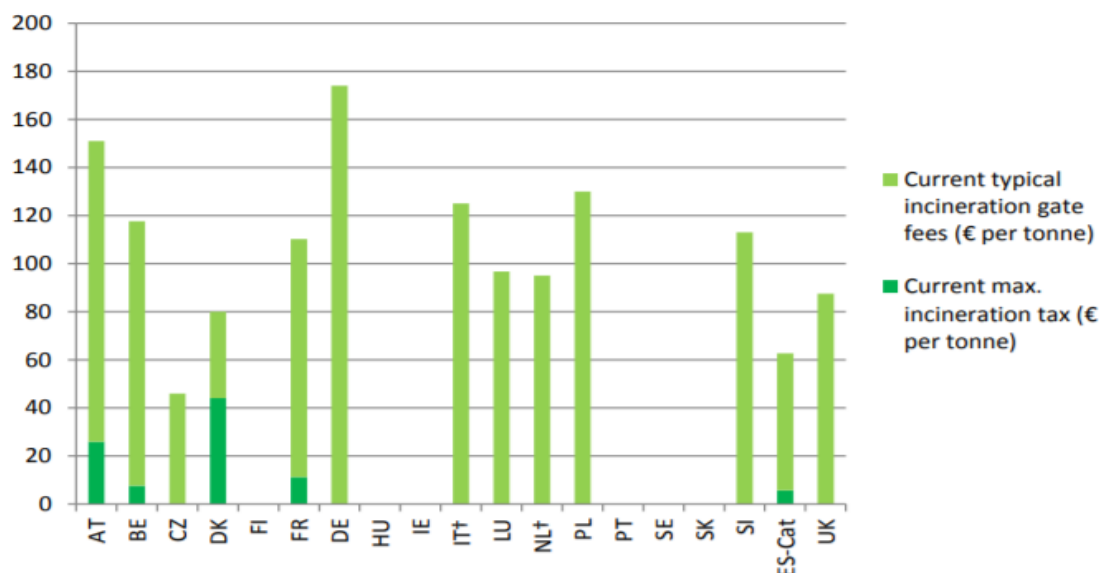
Based on the few information on the gate fees of the incinerators, there are some considerations to be made. First, there is not a clear method to define and compute the gate fees.

The gate fees (which are computed as the sum of cost minus revenues) and the total tariffs which include the contributions of the council, province or ATOs, are often misleading compared to the incinerator performance. The most striking example is Napoli because the fee fixed by the metropolitan city of Napoli includes in the costs the pre-treatment, the costs of emergency actions taken in the paste and the treatment costs of the so-called eco-bale. In this specific case, the waste entering the plant must be pre-treated. Second, the fluctuation/variability of the gate fees in remarkable with a typical gate fee of 98.59 Euro/tonne. Based on the Lombardy's fee (87.72 Euro/tonnes), Emilia Romagna PR applies a gate fee of 119 Euro/tonnes which is 35% higher. Napoli (NA) in Campania has the lowest gate fee of 64.68 Euro/tonne. Third, apparently the gate fees are not influenced by scale economy in the above-mentioned cases, or this factor may be compensated by other variables. For example, Vicenza in Veneto with the smallest plant in terms of capacity (82,000 tonnes/year) applies a fee smaller than Campania's plant which has the second largest plant in Italy (900,000).

3.3 Gate fees comparison in Europe

The typical incineration gate fees applied in Europe range from 46 €/tonne applied in Czech Republic, to 174 €/tonne applied in the UK. The total charge for incineration includes the incineration tax when applicable like in Austria, Belgium, Denmark, France and Spain (EC, 2012). Figure 5 presents an overview of the total typical cost of incineration in Europe which include gate fees and incineration tax.

Figure 5: Overview of total typical cost of incineration (municipal waste)



Source: EC, 2012 (2009 data: FI, HU, IE, LV, PT, SE, SK data not reported)

Italy with the average incinerator gate fee of 98.59 Euro/tonne tax excluded, is in line with the other European countries. According to the more recent European Commission study (EC, 2015), those typical costs of incineration hide differentiated local costs. In addition, not only the gate fees vary

among MS but also taxes vary: 6 Member States had incineration taxes for the disposal of MSW and they range from as little as €2.40 per tonne in FR to €54 per tonne in DK. Furthermore, in the case of the Netherlands they vary between national and imported waste. The Netherlands open their border by nullify taxes for imported waste, while they set high taxes for the incineration of national municipal waste to stimulate prevention and recycling (EC, 2015)

While in the case of landfill, higher costs tend to reduce the amount of MSW being sent to landfill, this is not applicable to incineration. This is a costly treatment option; therefore, incineration is convenient if the landfill taxes make incineration cost competitive. Where landfill is banned, incineration is the alternative solution to deal with residual waste (EC, 2012).

Another important factor affecting the gate fees is the capacity of the incineration facilities. Over-capacity has a proven impact on waste treatment prices by lowering the gate fees. The reason is that large sunk costs due to considerable investment in incineration facilities need to be paid off by extensive quantity of waste being incinerated (EC, 2015).

This had also an impact on medium-sized recycling industry in several European MS: lower incinerator gate fees subtracted material from recovery facilities causing their insolvencies (EC, 2015). This is called “vacuum cleaner effect” by the European Commission (2013).

Between 2007 and 2013 almost 300 new incinerators were constructed increasing the technical capacity of 25% up to more than 250 million tonnes per year. (EC, 2015). According to the study by the Global Alliance for Incinerator Alternatives (Jofra Sora and Puig Ventosa; 2013) some countries like Germany, Sweden, Denmark, the Netherlands and the United Kingdom have more incineration capacity than no-recyclable waste generated. Some countries like Italy, Germany, France, the UK and Finland are exporting countries in terms of waste flow for incineration while Austria, Germany, the Netherlands and Sweden are importer countries (EEA; 2014). These under- and over-capacity of incineration for municipal waste increased the volume of waste flow shipments (Brinstengel et al., 2011). In addition, competition on waste flow may hinder investments in recycling plants and compensation between countries may hinder the effort of some country in achieving the recycling targets set out by the Waste Framework Directive (WFD). Consequently, Europe may miss the waste treatment hierarchy (EC, 2015). Therefore, if compensation of under- and over-capacity of incineration among countries can be a valid solution in the short run, this should be evaluated in the long term also including other factors as the recycling industry presence and prosperity and the overall European goals in terms of waste hierarchy.

4. Discussion and conclusions

The "unblock Italy" law goes in the right direction. Incinerators are plants with high fixed costs and economies of scale. Therefore, it is more convenient to build few and efficient incinerators and free the “self-sufficient principle” which means that the flow of unsorted waste must be free and flexible between regions. However, this flexibility creates some problems: local emission overload risk, industrial concentration risk and «moral hazard». To maximize the benefits and reduce problems these are the possible solutions. One option is to establish that the use of plants in other regions requires access to a “network of last resort” set up by the State through the booking of available capacity, at regulated conditions. Alternatively, the purchase of capacity is achieved through competitive mechanisms (“market of the year before”). In the case of the access to the “network of the last resort” a strong economic penalty (eco-tax) need to be charged automatically to the regions that use them. This is possible for example by reducing State transfers to the affected municipalities and those incomes must go automatically to compensate the communities that host the plants. For example, the State component of the tax on land property (IMU) could be automatically reduced.

Another important point is that the rates of transfer to the plants must be regulated by ARERA together with a profit sharing. Authorizations to operate at max capacity can be set only with the decisive role of regional environmental agencies setting emission compensations. In Italy 90% of selection plants and 55% of incinerators are managed by private companies, either directly or through forms of public private partnership (PPP).

To overcome the problem of inhomogeneous tariffs among regions, it is necessary to design a national regulation of the waste treatment tariff i.e. the gate fees to landfills, incinerators and TMBs plants. This could avoid radical differences like between the Lombardia - free market condition and the Emilia Romagna which adopts a regulated approach. Additionally, the regulation should clarify the report rules for costs and revenues and set an independent monitoring system.

Another important improvement is necessary to avoid persistent conflicting roles of stakeholders. For example, the local authorities are members of the authority which determines the tariffs and assigns the waste service to the in-house companies. At the same time, the local authorities are shareholders of the same waste service in-house companies and it might be that they hold most of the shares.

The benchmarking system in terms of efficiency of the integrated waste management is also needed. This is possible by setting transparent and visible rules defining the gate fees of the treatment plants, by communicate and monitoring the system in a clear and transparent way, by favouring the analysis and comparison on the waste plant costs, by facilitating the potential entry of new operators thanks to transparent rules and regulations.

The main limit of this study is due to the restricted available information. On the other hand, it provides some share knowledge of the gate fees for incinerations in Italy, it compares it to the European scenario and it provides some footpath for the next actions to be taken by policymakers and regulatory authorities.

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