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WASTE MANAGEMENT SERVICES

-- Background Paper --

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1. Introduction

1. As social and legal norms have evolved over the years a number of markets for handling solid waste have been established. This paper focuses on solid waste from households, which is usually referred to as municipal solid waste ("MSW").[1] Households generate a variety of waste that is collected and sorted into different streams to be variously reused, recycled, recovered, incinerated as fuel or buried in a landfill.[2] The desire to reduce the nuisance, health and environmental consequences of waste gives rise to laws and regulations that restrict the conduct of households as well as businesses in the waste management sector.

2. The legal framework designs the space where competition might operate in the waste management sector. Landfill-hosting municipalities may restrict access to waste that originates outside their boundaries. Municipalities may also require that locally-arising waste be taken to the local waste facility. International trade rules empower countries to restrict the export or import of various kinds of waste, including MSW. Legislation may apply command-and-control regulation by specifying the shares of various types of waste that must be recycled or it may prohibit new landfill or incinerator capacity, thus blocking entry. Other laws shift incentives in order to shift behaviour, such as those that raise or lower landfill taxes and gate fees[3] at landfills, or feed-in tariffs for electricity or heat generated from waste. Command-and-control regulation in one market may be used to shift incentives in another, for example the regulations that specify the share of products that must use recycled materials increase the price of secondary raw materials and provide greater economic incentives for recycling. In other words, the legal framework constrains the geographic and product dimensions of markets, as well as the price levels of some inputs and outputs.

3. The "waste hierarchy" guides waste policy in many countries. It ranks options for handing waste, from the most to least preferred option as:

1. prevention, i.e., not to generate it;
2. prepare for re-use;
3. recycling;
4. other recovery, e.g., energy recovery; and

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1 Different jurisdictions use different terminology and definitions. Statistics and markets often combine waste collected from households and commercial establishments. For example, the EU's Landfill Directive defines municipal solid waste as, "waste from households, as well as other waste which, because of its nature or composition, is similar to waste from households." This paper does not address the disposal of vehicles nor of industrial or construction waste.

2 When the legal disposal of waste becomes too costly or too burdensome, households can also dispose of the waste illegally, for example they can shove it off the back of a truck on a dark night on a lonely stretch of road. This risk is not trivial and it restricts feasible collection charges. In Ireland, an estimated 19% of households, rising to 54% of rural households, did not use a household waste collection service in 2009. (Gorecki and Lyons, 2011, citing Ireland Environmental Protection Agency 2011, p. 26.) .

3 A landfill tax (incineration tax) is imposed by a public authority for disposal at a landfill (incinerator). A gate fee or "tipping fee" is imposed by a landfill (or incinerator) operator for disposal. Users pay the sum of tax and fee.

5. disposal.[4]

4. The outcome oriented approach of the waste hierarchy can be difficult to relate to the decentralized, market-oriented approach of competition policy.[5] Hence, the hierarchy itself, but not the regulation it engenders, is not further discussed here.

5. The quantity of MSW has been increasing with population and living standards but there are also national differences. In the US, for example, per capita daily generation of MSW was about 2 kilograms in 2011 versus 1.7 kg in 1980 and 1.2 kg in 1960.[6] Figures for EU countries are lower, with 1.4 kg per capita generated daily in 2010.[7]

6. MSW is also increasingly being recycled or incinerated in developed countries. For example, in 27 EU Member states the share of municipal waste that is recycled increased from 11% to 24% between 1995 and 2009, while over the same period the share sent to landfills declined from 68% to 38%. The averages hide significant variations, e.g., country-by-country rates of landfilling of MSW range from less than 5% to 100%.[8] For the US, in 1960 only 6% of all MSW was recovered (roughly, recycled plus net exports) but in 2010 this figure had grown to 34%.[9]

7. International trade in MSW, as well as trade in hazardous waste, is to be reported to the Secretariat of the Basel Convention. Acknowledging their incompleteness and their age – they date from 2004-06 - the available data show that eight of the top ten importers, and all ten of the largest exporters of all types of waste reported by the secretariat, were OECD members. [10] These countries represented about 80% and nearly 70% of the totals reported. MSW and its residuals after incineration constituted 10% of the total export. Anyway "the vast majority of hazardous and other waste is still treated within the country of origin."[11] The clearly incomplete figures reported for the household waste generated annually range between 176 and 138 million tonnes in the three years, while the average amount of household waste exported annually is about 1 million.[12]

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4 This hierarchy is from EU Directive 2008/98/EC, the Waste Framework Directive, Article 4. The United Nations' version is broader, with the first two elements common with the EU's first three, plus 3) promoting environmentally sound waste disposal and treatment; 4) extending waste service coverage. (UNEP n.d.)

5 It is difficult but not impossible. Gorecki et al. (2010) point out that the waste hierarchy may be consistent with the economic approach, if the price of each treatment option reflected its net cost and the price of the less preferred option was higher than that of the more preferred option, at each step. But there is no guarantee that would be the case. (p. 8) Imposing an additional requirement, that prices be the outcome of markets rather than administration, does not make the hierarchy's quantitative outcome more likely.

6 US Environmental Protection Agency (2013), table 4.

7 Eurostat (2012)

8 Bluementhal (2011)

9 US EPA (2011)

10 The top importers are: Germany, Italy, Belgium, France, USA, Netherlands, Mexico, Canada (OECD members) and. Belarus and Malaysia (non OECD members). The top ten exporters are Netherlands, Germany, Italy, USA, Belgium, Switzerland, France, Austria, Canada, and Ireland (all OECD members).

11 Secretariat of the Basel Convention (2010), p. 4.

12 Secretariat of the Basel Convention (2010), Tables 8, 9, 10 and 15.

8. Competition issues have arisen and may arise throughout the MSW sector. The cost structure of collection and disposal leads to high market concentration. If there is competition to win the contract to collect MSW in a locality, it can be subverted by inadequate access to facilities such as a transfer station or landfill, or by unequal conditions of competition between public and private bidders, or by bid-rigging. Competition in markets for incineration services, landfills or waste transfer stations may be restricted by regulation based on the waste's geographic origin. Mergers may restrict competition in markets with high entry barriers. Schemes that collect, sort and recover recyclables into secondary raw materials, such as those for waste packaging, may enter into contracts that exclude rivals from markets or may price in a way that excludes rivals.

1.1. Earlier discussions on waste management by OECD Competition Committee

9. The OECD Competition Committee has discussed waste management on at least two previous occasions. Solid waste management was examined in 1999 during a roundtable on the provision of incentives on local government for efficient provision of local public services.[13]The main findings that emerged from that discussion were:

- Waste collection and waste treatment are two distinct activities. Economies of density determine whether competition may take place in the market. Few countries rely on in-the-market competition for collection of household waste, whereas in-the-market competition is possible and common for industrial and commercial waste collection.

- Waste collection can be efficiently provided through for-the-market competition. However, the efficiency results depend on the characteristics of the competitive tendering procedure, of the contract and of its enforcement.

- Unit-based charging for waste for disposal enhances demand for recycling and discourages waste production; on the other hand, charging for waste collection provides greater incentives to illegally dump waste.

10. Industry joint ventures in waste management and recycling services comprised one part of an examination of horizontal agreements in the environmental context undertaken by the Competition Committee in 2010.[14] The discussion highlighted that competition authorities have intervened against provisions in the agreements that form the basis for producer responsibility schemes[15]. In particular, they have intervened against those provisions that limit independent collection and recycling services, quotas allocating recycled products according to historical market share, and those that limited dealing with third parties which were seen as preventing the development of rival waste management and recycling schemes. Authorities have also prohibited and allowed, in different circumstances, agreements to pass on recycling fees to consumers. A key finding was that interventions to remove anticompetitive constraints in these schemes' agreements did not undermine the achievement of the environmental goals but, on the contrary, led to better functioning markets that increased incentives for efficiency. It was also concluded that, while

13 OECD (2000)

14 OECD (2010)

15 As it will be explained in greater detail below (section 4) producers are increasingly considered responsible for the products it has placed on the market even at the post-consumer stage of the products' life[15]. They can fulfil this obligation individually, or by participating in a producer responsibility scheme along with other responsible parties, or by buying the service from third parties.

there may be a case for a monopoly collection and recycling scheme at the outset, the arguments for a single system should be reviewed critically and, once underway, restrictions that prevent new entry should be phased out as soon as possible.

11. The current paper builds on the earlier two. Technological and political change in the past 14 years have altered the economics of waste collection and landfilling. Landfills are more distant and larger. More waste is diverted away from landfills and towards treatments that allow to re-use it and recycle it, as well as to recover energy from it. New structures, the producer responsibility schemes, now play a large role in the waste management sector.

12. The remainder of the paper is organized as follows. Section 1.2 briefly describes the physical processes waste undergoes after leaving the bin. Section 1.3 provides an overview of the international trade rules for MSW. The subsequent sections concern competition issues in, respectively, collection, (Section 2); waste transfer stations, landfills and incinerators (Section 3); and schemes to fulfil extended producer responsibility as well as markets related to such schemes (Section 4). The final section concludes.

1.2. Beyond the bin: physical processes

13. Waste is a substance that the holder discards or is required to discard. Once there is demand for it, it ceases to be waste.[16] Thus, waste by definition has no or negative market value. In addition, waste often imposes costs on others, i.e., has negative externalities. Since waste is unwanted and population size and density means free disposal is no longer available, there is demand for services to remove it and transform it into not-waste.

14. After waste is placed by a household into one or more bins at the kerb, it is collected in specialized trucks and usually transported to a transfer station where it is unloaded.[17] At the transfer station, the waste is often screened to separate out recyclable materials ("recyclables"), compostable materials, and hazardous or otherwise inappropriate waste. Recyclables include materials such as aluminum and steel cans, paper and cardboard, glass and other packaging. The various waste fractions are then compacted at the transfer station, loaded onto larger vehicles, railcars or barges and dispatched. Possible destinations include composting facilities, materials recovery facilities where the various recyclables are separated out and prepared for re-use or recycling, incinerators for energy recovery, and landfills.

15. In OECD countries this pattern has largely replaced the old pattern for handling household waste. No longer does the municipal garbage truck carry off the load, unsorted, to the town dump. Old, nearby landfills have closed because they are filled, or because there is less tolerance for locating landfills near human habitations or because stricter regulations make larger landfills serving a larger region more economic. The greater distance between collection points and landfill has prompted the use of waste transfer stations, which lowers the cost of transport over longer distances, both by removing material into recycling streams and by compacting the residual.[18]

16. Figure 1 below summarizes the flow.

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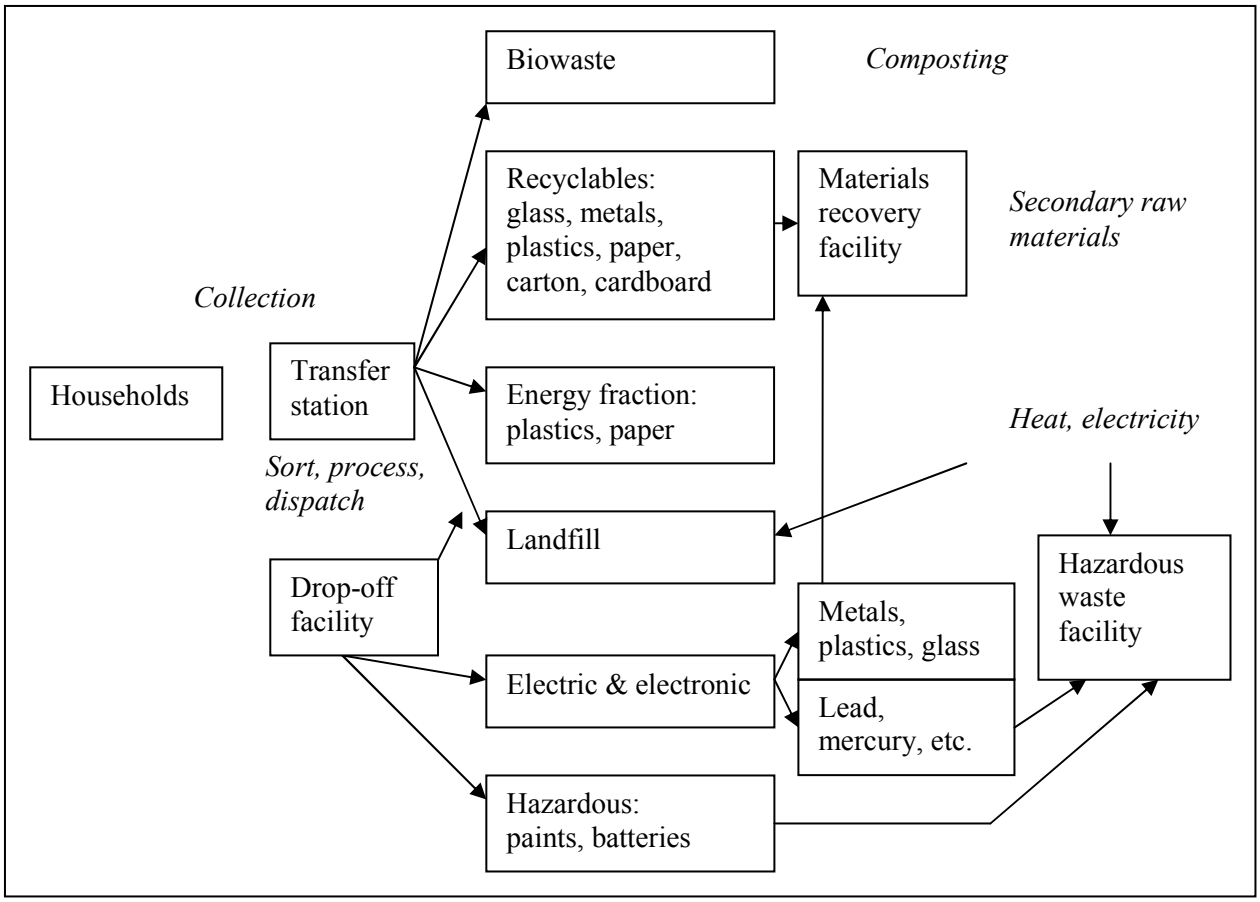
16 The definition is approximately that of EU Directive 2008/98/EC Articles 3.1 and 6.1.

17 Rather than kerbside collection, recyclables may be dropped-off by householders at nearby containers, from which they are collected. Or the transfer station may offer such facilities. In some areas, there may be no kerbside service at all and householders must arrange the transport of all their waste.

18 US EPA (2002)

Figure 1. Flow of MSW from households to secondary raw materials or disposal



17. Collection is the most expensive phase. Estimates range from 40% to 80% of the total cost. Even at the lower end of the range, an increase in the efficiency of collection would have a large effect on waste handling efficiency as a whole.

18. The details of collection have implications for the following stages. The separation of waste at source can yield higher quality secondary raw materials that command higher prices. Such separation reduces the chance of mixing different types of material which enables the sorting machines to work more effectively, reduces the mass that must be sorted to attain a given level of sorting, and results in more homogeneous secondary raw materials. In addition, mixing, for example, glass among plastics can increase wear and tear on the machines.

19. The introduction of extended producer responsibility for packaging waste has prompted the development of systems that support producers in fulfilling this obligation. In these systems, exemplified by the German "Green Dot" scheme, waste packaging is placed by households into a distinct bin, collected separately (albeit perhaps only a separate storage chamber within a common collection truck), and follows a separate stream through processing to be transformed into secondary raw materials. The same type of system has been adopted for other types of waste, notably for waste electrical and electronic equipment but also for car tyres, cars, batteries and accumulators.

20. Waste that cannot be recycled and re-used is often sent to incinerators, which yield heat for district heating, industrial processes, and electricity generation. Landfills are used less extensively. [19]

21. Having now described the main physical processes from kerbside to secondary raw materials or fuel or permanent disposal, the next section provides an overview of the relevant international trade rules. Subnational rules are touched upon in the section on collection and landfills.

1.3 International trade rules for MSW

22. A large number of countries have found that the liberalization of international trade in goods and services and competition policy play complementary roles in promoting economic efficiency, development and growth.[20] More recently, an OECD Council Recommendation on the Environmentally Sound Management of Waste[21] pointed out the potential for trade restrictions to distort competition in markets where secondary raw materials compete with primary raw materials.[22][23] In an analogous way, international trade rules may distort competition in markets for waste handling services and for waste destined for incineration.

23. The movement of waste across international borders is restricted by international treaty and agreement. Although the primary purpose of the international trade regime is to prevent hazardous waste from being dumped in countries unprepared to handle it in an environmentally appropriate way, the regime also restricts trade in MSW and the residue after MSW has been incinerated. Nevertheless, trade may occur among OECD countries. Indeed, EU countries do trade in waste. Some of this trade involves the movement of waste to specialized recovery facilities because not all countries have a complete portfolio of these facilities. Other intra-EU trade involves combustible fractions of MSW destined for incineration. By contrast, trade in MSW destined for disposal in landfills is largely blocked.

24. MSW is subject to specific international trade rules. World Trade Organization ("WTO") rules allow members to impose restrictions on trade to protect the environment, if they meet certain standards. Both the Basel Convention and the 1990 OECD Council Decision-Recommendation discourage transborder movement of MSW and of hazardous waste. In addition to these international rules, EU

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19 Article 11 of the EU Waste Framework Directive 2008/98/EC specifies that Member States should establish separate collection from households of at least paper, metal, plastic and glass by 2020.

20 WTO (1998)

21 OECD Recommendation of the Council on the Environmentally Sound Management of Waste C(2004)100.

22 Trade in services that reduce the magnitude of waste's negative value has the same efficiency effects as for other positively valued goods or services. However, if waste's negative externalities are not properly internalized then trade in waste reduces the welfare of some persons. For example, if a waste importer does not ensure that no nearby resident suffers losses in environmental quality, then the trade harms those residents. "Host fees," discussed below in reference to domestic trade, are one means of compensating for the cost of hosting a waste facility. If the recipients or beneficiaries of the host fee are not identical to those that suffer the negative externalities, then the trade harms them.

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countries are subject to EU acts that also discourage transborder movement of waste, but which allow for trade in waste that will be incinerated in energy efficient facilities and for trade in materials recovered that are, by virtue of processing, no longer waste.[24] These legal instruments are briefly described below.

25. Article XX of the General Agreement on Tariffs and Trade (also known as GATT) contains the relevant WTO rules on trade restrictions to protect the environment. Box 1 contains some excerpts.

Box 1. GATT Article XX

"Subject to the requirement that such measures are not applied in a manner which would constitute a means of arbitrary or unjustifiable discrimination between countries where the same conditions prevail, or a disguised restriction on international trade, nothing in this Agreement [the GATT] shall be construed to prevent the adoption or enforcement by any contracting party of measures: ...

"(b) necessary to protect human, animal or plant life or health;...

"(g) relating to the conservation of exhaustible natural resources if such measures are made effective in conjunction with restrictions on domestic production or consumption. ..."

26. A three part test has been developed for Article XX (b).[25] According to this test, a policy must:

- be designed to have the health policy objective,
- be necessary to achieve that objective, and
- meet the requirements of the chapeau of Article XX.

27. WTO jurisprudence and decisions have clarified how three key phrases in Article XX (g) should be interpreted. Two are relevant here. "Relating to" has been interpreted as "primarily aimed at", while "measures made effective in" has been interpreted as a "requirement of even-handedness in the imposition of restrictions."

28. Two other parts of the WTO regime could also be relevant to trade in MSW. The Agreement on Technical Barriers to Trade may apply to the establishment of standards for secondary raw materials.[26] It encourages but does not oblige to harmonize national standards with international standards, and it does not prevent to establish stricter national standards. The Agreement on Subsidies and Countervailing Measures concerns, *inter alia,* subsidies that are specific or that are contingent on the use of domestic over imported goods and that adversely affect the interests of another member. Whether a subsidy is specific in fact depends on the practical application, for example, if it were limited by the inherent characteristics of

24 Although not discussed here, there is jurisprudence on when waste is no longer waste and how to distinguish waste from used products, and recovery from disposal. The distinctions affect which trade rules apply.

25 Legal Affairs Division, WTO (2012), paragraphs 888 *et seq.*

26 Low, *et al.* (2011). Although the paper addressed the assessment of measures against greenhouse gases, there is no reason to expect the legal principles would be different for other environmental measures.

the good. The question of whether subsidies to, say, an incinerator that displaces or impedes a foreign incinerator's access to waste, would be prohibited has apparently not been addressed.

29. The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal ("Basel Convention"), despite its name, applies to MSW[27] and its downstream products destined for recycling, recovery and re-use.[28] The Basel Convention provides *inter alia* that states should reduce to the minimum the transboundary movement of hazardous or other wastes (a term that includes MSW) consistent with the environmentally sound and efficient management of such wastes[29] Parties have the right to refuse to import hazardous or other wastes for disposal.[30] Parties must block export to countries that have notified that they refuse to import waste, as well as exports to south of 60 degrees south latitude. The Basel Convention has a procedure to notify and object to transboundary waste movement.[31]

30. OECD Decision-Recommendation on the Reduction of Transfrontier Movements of Wastes applies to all waste covered by the Basel Convention, which includes MSW.[32] OECD members should, consistent with environmentally sound and efficient management practices, dispose of the waste they generate in their own territories and reduce transfrontier movements to the minimum.

31. Two EU acts complement these more global rules with respect to trade in waste within the EU and generally guide the waste management conduct of Member States. The 2006 Regulation on shipments of waste[33] and the 2008 "Waste Framework Directive"[34] establish the legal framework. Among other things, they impose the obligation to handle waste in a way that harms neither the environment nor human health, encourage the use of the "waste hierarchy," and require the costs of disposing of waste to be borne by the holder of waste, previous holders or by the producers of the product from which the waste was

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27 The Convention lists in Annex I categories of waste, in Annex II wastes requiring special consideration, and in Annex III characteristics. The Annex II wastes are "waste collected from households" and "Residues arising from the incineration of household wastes." The Convention controls the transboundary movement of waste which (1) belongs in Annex I and Annex III, or (2) is defined as hazardous by the domestic legislation of the exporting, importing or transit Party, or (3) belongs in Annex II. (Secretariat of the Basel Convention, "Manual for Implementation.").

28 Secretariat of the Basel Convention (2012)

29 Article 4.2(d)

30 Article 4.1(a)

31 The procedure for the transboundary movement of waste under the Basel Convention is as follows. Each State has a competent authority. The competent authority is the governmental authority responsible for receiving and responding to notifications of transboundary movements. The generator or exporter in the exporting state notifies, through the competent authority in the exporting State, the competent authorities of any State concerned in the proposed transboundary movement. Export, transit and import States are concerned. The same form is used for Basel Convention, OECD Decision, and European Community Regulation. A competent authority may object to the transboundary movement. Competent authorities may object to transboundary movements. The exporters and importers are waste generators, or owners of disposal or recovery facilities, or recognized traders and brokers. Waste carriers, traders and brokers must be registered, and any person who arranges or facilitates the shipment of waste must use only registered traders and brokers.

32 OECD Decision-Recommendation of the Council on the Reduction of Transfrontier Movements of Wastes [C(90)178/FINAL].

33 Regulation on shipments of waste No. 1013/2006 of 14 June 2006 (OJ L 190, 12.7.2006 p. 1).

34 Directive 2008/98/EC of 19 November 2008 (OJ L 312/3-30 22.11.2008).

transformed.[35] Member States must establish a network of waste disposal installations and of installations for the recovery of mixed municipal waste (approximately MSW) collected from private households. Waste is to be disposed of or recovered in one of the nearest appropriate installations. Waste shipments must be pre-notified, and either the dispatching or destination State may object to the shipment of mixed municipal waste. Member States may limit incoming waste shipments if it has been established that such shipments would force deviation from waste management plans, and to limit outgoing shipments of waste on environmental grounds.

32. There are, however, limits to the restrictions that may be imposed on trade within Member States. A European Court of Justice ("ECJ") preliminary ruling in 1996 in *Dusseldorp*[36] found that an exclusive right to recover certain waste combined with a prohibition to export the waste favored the national undertaking and strengthened its dominant position. But in 2000 the ECJ found that a legal monopoly does not necessarily violate competition law, if it is the least restrictive way to achieve a mission of general economic interest.[37]

33. Changes between the EU rules set out in the 2006 Regulation and in the 2008 Directive promoted the development of a market for waste for incineration in energy efficient facilities. This illustrates the degree to which the nature, and indeed the existence, of competition in the waste management sector depends on regulation. The 2006 Regulation specifies that Member States should prohibit generally or partially, or object systematically to waste shipments for disposal, and its definition of disposal includes incineration of MSW. The 2008 Directive defines as "recovery", and no longer as disposal, the incineration in plants meeting a given standard of energy efficiency. It thus allows trade in waste for incineration in energy efficient plants. [38]

34. Transboundary shipments of waste of all types within Europe were studied in a report by the European Topic Centre on Sustainable Consumption and Production.[39] The report's brief literature review identifies possible reasons for waste being traded rather than treated domestically.[40] Among these reasons

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35 The "producer pays" principle refers to the generator or holder of the waste paying the costs of avoiding or alleviating adverse consequences of waste on the environment. An "extended polluter pays" principle imposes obligations on the original producer of the product which, over its lifetime has been transformed into waste, as well.

36 Case C-203/96, *Chemische Afvalstoffen Dusseldorp BV and others*, judgment of the ECJ of June 25 1998, ECR [1998] I-4075.

37 A state-granted exclusive right to receive building waste was, in the circumstances, the least restrictive means to achieve a mission of general economic interest, that is, expansion in order to have sufficient capacity to recycle building waste. Case C-209/98, *Entreprenørforeningens Affalds/Miljøsektion (FFAD) v Københavns Kommune*, judgment of the ECJ of 23 May 2000, ECR [2000] I-3743.

38 One provision in the 2006 regulation defined mixed municipal waste (MMW, approximately MSW) shipments for disposal or recovery as shipments for disposal (Article 3, paragraph 5). Another provision defined a basis for refusal of a shipment of waste for disposal as the waste being MMW (Article 11, 1 (i)). Recital 20 of the Directive states that, "This Directive should also clarify when the incineration of MSW is energy-efficient and may be considered a recovery operation." This was carried out by listing incineration of municipal waste in facilities meeting a specified level of energy efficiency in the list of "Recovery operations."

39 ETC/SCP (2012)

40 The review also noted that the general literature is highly biased towards East Asian case studies. The characteristics that incentivise waste trade may differ between the sets of countries. For example, EU waste-related acts apply only to EU countries.

it lists; differences in environmental regulation, differences in market prices (such as gate fees), and differences in technology or capacity. The report also identifies factors that increase trade in waste within Europe, among which it lists differences in:

- gate fees and taxes;
- transport costs;
- treatment capacity and the specific treatments available;
- incentives for recycling or recovery, e.g., incentives on recovering energy from waste;
- stringency of classification of material.

35. Tariff and non-tariff border restrictions may impede trade. Anecdotal evidence supports these lists of factors. For example Denmark prohibits the shipment of waste destined for disposal into the country, unless the dispatching country has no suitable disposal options and the quantity of waste is too small for the establishment of a new, specialised disposal facility in that country to be economic.[41] In the Netherlands, trade—import or export—in waste for landfill is prohibited, but trade in non-hazardous waste for incineration was liberalised in 2007.[42] Since then the import of waste for incineration into the Netherlands has increased rapidly.[43] In Italy excess supply of compacted MSW is exported from some regions to other member states since access to landfill or incineration capacity in other Italian regions is refused on the basis of the "proximity principle" contained in the Waste Framework Directive.[44][45]

36. In summary, international rules generally discourage trade in waste, including MSW. They provide that waste shipments must be pre-notified and may be refused by the dispatching or destination country. Nevertheless, material that is derived from waste may be re–classified and not be subject to these rules, and waste that is destined to be incinerated for energy recovery may become subject to a somewhat liberalized trade regime. Consequently, international trade has developed in secondary raw materials as well as in waste destined for incineration.

2. Waste collection

37. In general municipalities are usually responsible for residential waste collection and they typically choose between performing the service themselves, perhaps jointly with other municipalities, and contracting with either a private or a public provider. Less frequently, individual households arrange individual contracts with collection providers who compete against each other. Where municipalities purchase these services through competitive tenders, possible competition issues include cartelization and competitive neutrality between public and private providers, as well as merger-induced restrictions on the pool of potential bidders. "Flow controls," i.e., laws, regulations or contracts that restrict where the

41 Danish Ministry of the Environment (2010)

42 Netherlands Ministry for Housing, Spatial Planning and the Environment (2008), pp. 11, 13, 14

43 ETC/SCP (2012)

44 Idem. (2012)

45 The "proximity principle" refers to a concept in the Waste Framework Directive according to which the network of waste disposal and recovery facilities "shall enable waste to be disposed of or…recovered in one of the nearest appropriate installations…." (Article 16, para. 3).

collected waste may be taken, or other barriers to accessing waste transfer stations, landfills or incinerators can distort competition as well by limiting the pool of potential bidders.

2.1. Collection markets as natural monopolies

38. Several studies have addressed the question of whether MSW collection markets are natural monopolies and therefore if it is economically more efficient to have just one provider. These studies have found that the existence of large economies of density justifies concluding that these markets are natural monopolies and, hence, that having a single provider is more efficient.

39. According to the empirical literature reviewed in OECD (2000) and in Irish Competition Authority (2006) if multiple providers are used for the collection of waste from households and small commercial establishments the unexploited economies of population density lead to significantly higher costs − estimates range between 26 to 48% − [46] Instead collection from large waste producers or collection of waste that needs timely or unusual handling, collection does not exhibit significant economies of population density and can be handled by competing providers. Antonioli and Filippini (2002) find that franchised monopoly was more efficient than side-by-side competition. Walls et al. (2005) claim that decisions by municipalities on whether to competitively tender waste collection from households are consistent with the existence of large economies of population density. Scale economies instead seem to be exhausted fairly quickly. OECD (2000) cites studies that suggest that scale economies in the US were exhausted at 50,000 inhabitants, while a study for the Italian competition authority found that scale economies are exhausted at 16,000 inhabitants.[47]

40. Indeed the typical arrangement is for the provision of these services is to have a single collector of household waste that serves each area. Nevertheless, despite the cost structure just described, competition in the market for the provision of collection services occurs in places as disparate as Ireland, Poland, some regions of Finland and parts of the US.

41. Given its rarity, it is perhaps interesting to examine an example of "side-by-side" competition for household waste collection: Ireland. In 2011, the number of operators in each local authority areas ranged

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46 Economies of population density should not be confused with economies of density. The latter term is related to changes in costs as output expands while maintaining a given network. An example is Waters (2007):

"A significant development in all of this research [in "rail cost analysis"] was refining the distinction between economies of scale and density. The latter is the behavior of costs as output expands over a given network, whereas economies of scale focuses on the behavior of costs if the network size increases as output expands." Waters, W.G. II, "Evolution of Railroad Economics." In Dennis, S. and W. Talley, ed.s, *Railroad Economics (Research in Transportation Economics, vol. 20)*. Oxford: Elsevier, 2007.

Since waste collection routes are flexible, the network is easily reoptimized and costs are consequently in general lower than with an inflexible network such as a railway.

Confusion of the two concepts can lead to erroneous analysis. Thus, in testimony before a High Court case in Ireland, one a witness testified that, although reducing the number of collecting trucks on a single route from two to one would speed up the operation, from 1.9 to 2.8 bins per minute, the limited capacity of the trucks meant this had no effect on the number of runs, thus amount of household waste, per day. The possibility of changing the routes to reduce costs, for example, to have an extra run per day, was not explored in the reported testimony or decision. *Neurendale Ltd t/a Panda Waste Services -v- Dublin City Council & Ors* [2009] IEHC 588. Testimony of the witness is discussed at paragraph 93 and of another witness on the same point at paragraph 89.

47 OECD (2000), p. 112

from two to fourteen, but the operators did not compete to serve all households in the areas - some operators only served a few households — and no collection was offered in some rural areas.[48] According to market enquiries conducted prior to 2005 by the Irish competition authority larger firms tended to control specific areas, with competition occurring over those households located at the boundaries. Evidence on consumer switching patterns further reinforces the picture of limited head-to-head competition: a 2011 survey reveals that households switch waste collectors at a rate (3% in the prior twelve months) lower than for electricity provider (9%) or fixed line telephone service (7%).[49]

42. A decision by the Irish Competition Authority (2005) following an investigation of allegations of dominance abuse by a waste collection company, Greenstar provides a more detailed picture of competition in a specific geographic market where in-the-market competition was permitted, northeast Wicklow. In that area, Greenstar was the sole provider. No entry had occurred during the prior five years and providers in adjacent areas had offered no competition. There were significant barriers to entry and expansion in the form of scale and density economies, and regulatory barriers significantly delayed the establishment of sorting/recycling facilities.

43. Nevertheless in 2011 In a Submission to the Department of the Environment, Community and Local Government in 2011 the Irish competition authority changed its views are reported that, on balance, side-by-side competition may be superior for densely populated areas. It argued that this form of competition is more responsive to changes in technology and in market circumstances. Where different municipalities make different choices on the type of competition to allow side-by-side competition in one area may also improve competitive tendering in neighbouring areas by providing a ready pool of potential bidders. Further, competitive tendering must be well-designed and implemented to provide the advertised efficiency gains and not all local authorities may have the skills to do so. However, it also found that side-by-side competition may be unstable: if one firm gains a sufficient density of customers in a geographic area, this enables it to gain a cost advantage and to exclude equally-efficient competitors and, thus, to exercise market power.

44. The authority also pointed out that where a system of side-by-side competition has already been established, there may be economic and legal costs to switching to competitive tendering. The costs cited by the authority include "the need to develop expertise in public procurement at a central level," and the high legal costs that may arise from litigation since "the private firms involved have made major investments and created vested interests".

45. These costs may be absent in a switch from municipal provision to competitive tendering. This glimpse of "competition in the market" in the collection of MSW in Ireland suggest that, in practice, only a few households − those on boundaries and those in densely populated area − enjoy a competitive choice and that some are offered no service at all. The aggregation of demand through contracting by the local authorities could increase the density of population that is served by a single collector, thus decreasing costs. The aggregation of demand could also change the distribution of bargaining power and provide a mechanism to subsidize service to rural households.

46. In Finland there is side-by-side competition in waste collection in some areas, but competitive tenders are used in others. Evidence shows that the price for municipal waste collection is lower where competitive tenders are used: average savings are estimated to range from 20-25% to 40%.[50] Tukiainen and

48 Ireland EPA (2013)

49 Ireland Department of Environment, Community and Local Government (2012), p. 24)

50 The first figure is in Irish Competition Authority (2011) citing "A 1997 survey by the Association of Municipalities in Finland" (p. A2). The second figure is from Tukiainen and Mälkönen (2010).

Mälkönen (2010) found that, on average, 0.39 fewer firms compete to supply municipalities using competitive tenders, than those which have side-by-side competition. Unlike in Ireland, Finnish householders must purchase waste collection services. Also, Finnish municipalities may direct the waste collector to transport and manage waste at local or regional facilities.[51]

47. The structure of costs for collection from households contrasts with that for collection from businesses, where indeed competition in the market is the norm.[52] In the "small container commercial hauling market," whose customers are apartment buildings, stores and restaurants, individual customers typically negotiate with the providers. In any given locality, the number of significant providers is nevertheless usually small: in the US these are four or fewer. Also for this kind of waste geographic markets are small, barriers to entry high, and scale economies significant.[53]

2.2. Choice of provider of collection services

48. Municipalities typically are responsible for ensuring MSW collection in their area. Traditionally they performed this task themselves, but private firms may also be contracted to provide this service. In this respect, OECD members are on diverging trends, with some, such as Ireland and the US, moving towards greater private provision of residential waste collection and others, such as France, Germany and some countries in Eastern Europe, moving towards greater municipal provision.[5455] The shift towards public provision and away from competitive tendering is partly attributed to the need for local government to find means to increase their revenues.[56]

49. Where a municipality does not provide the service in-house, it often chooses providers by competitive tender. Competitive tendering can involve just private firms bidding against each other or can include municipal departments or municipal companies bidding against private firms.

50. The next few paragraphs discuss competitive tendering and summarize the empirical literature on the cost differences between competitive tendering and monopoly municipal provision.

51. OECD (2000) identifies the conditions that are necessary for competitive tendering to yield lower costs than in-house provision by municipalities of local public services. These are:

- low sunk costs—here, meaning that key assets are not significantly more valuable within a particular commercial relationship than outside it,
- no informational advantage to the incumbent,
- ease of quality monitoring, and

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51 Ireland Department of Environment, Community and Local Government (2012), p. 14

52 In the 2008 Republic-Allied Waste merger in the US, for example, four was the largest number of pre-transaction significant competitors in a market.

53 US Department of Justice, Antitrust Division (2003 and 2008)

54 Veolia Environment (2013), p. 48.

55 For example, in Ireland only three local authorities continued to collect waste in 2011, as compared with six in 2011 and fifteen in 2008. Ireland EPA (2013), p. 26.

56 Handelsblatt (2013)

- a sufficient number of competitive bidders.

52. OECD (2000) finds that these conditions are generally met in markets for the collection of household waste. However, more recent data suggests that there may be an incumbency advantage: a study of re-tendered waste collection contracts in the UK found that 42% of these were won by incumbents versus 27% won by non-incumbents.[5758]

53. A large number of empirical studies have been performed to estimate the effect of competitive tendering for the provision of household waste collection services. The literature review in Irish Competition Authority (2006), which partly incorporates that in the OECD report (2000), found evidence of cost savings from competitive tendering, ranging between 10% and 33.5% with many close to 20%. A few of the studies sought and found no evidence that quality had declined, but one found that quality had declined in 8% of instances where competitive tendering had replaced municipal provision. Thus, the empirical evidence suggests that competitive tendering for household waste collection results in large cost savings and, less reliably due to fewer studies, no quality deterioration.

54. However, the inclusion of a municipal company among bidders risks distorting competition if the company receives state funding as the monopoly MSW collector in other municipality. Hence accounting separation between monopoly and competitive activities, allocation of a "fair portion" of common costs across economic activities and the payment of income tax are important. These indeed were conditions imposed to limit state-funded activities subsidizing competitive activities in a recent decision concerning Norway.[59]

55. A separate but related question is whether the inclusion of a municipal company among the bidders increases competition. The UK OFT (2006, p. 49) reports the result of a survey of local authorities that suggests that the presence of a public bidder slightly reduces the average number of bids from private suppliers, but increases the overall average number of bidders (because in addition to the private bidders there is also a public bidder).[60]

2.3. Improving competition in tenders for collection

56. Both the details of the contract to collect MSW over a defined territory and the details of the tender procedure can affect competition in the immediate tender and in future ones. Contract duration affects competition where significant costs are sunk, because bidders shade their bid to account for the risk of hold-up. This may be less important for waste collection itself, but is significant for facilities where the waste is deposited, either temporarily or permanently. Access to or ownership of a disposal facility is

57 No data or no previous contracts were available for the remaining 31 per cent of LAs' collection contracts. UK Office of Fair Trading (2006), p. 34.

58 For all types of waste services contracts, an incumbent is more likely to win when a contract is re-tendered if it is a municipal entity (48%) than if it is a private company (30%).UK OFT (2006), p. 52.

59 EFTA Surveillance Authority 2013.

60 The survey shows that on average the number of credible bidders was 2.06 when there was no public bidder, but 2.57 when there was one. Competitive non-neutrality, or the perception thereof, results in an average drop from about two to about one and half of the private participants in the bidding, but it did not lead to an overall drop in the number of bidders because the presence of the public bidder more than compensated the reduction in the number of private bidders.

necessary to participate in waste collection markets: if the municipality does not own such a right or facility, then bidders are limited to those who have or can acquire such a right. Competitive non-neutrality among the bidders can result in less-efficient bidders winning the contract and non-participation in the tender of disfavoured bidders.

57. Studies of successes and failures in infrastructure concessions provide more general guidance on how to structure the competition, as well as on the contracts and the renegotiation mechanisms. A stable regulatory regime, competitive rather than direct award, appropriate tariffs, clear rules for tariff readjustment and for other contract renegotiations, proper assessment of the residual value of the concession-specific assets, and sound regulatory accounting promote the efficient choice of the concessionaires and operation of the concession. [61]

58. Access to a facility to deposit, temporarily or permanently, the collected waste is a prerequisite to compete in the waste collection market. Disposal facilities operate at larger scale than collection, and the barriers to entry in this market are much higher, both in terms of cost and time. Hence, if entry into collection also requires the simultaneous building of a disposal facility, then entry in the upstream market would be substantially delayed. Therefore, a strategy that avoids the need for simultaneous entry into the two activities increases competition in the collection market.

59. One option is for the municipality to own a disposal facility and allow access to the winner of the tender. Interestingly, one study found that municipalities in the US were more likely to use government provision of waste and recyclables collection services (i.e., to provide it themselves or as part of a group of municipalities) than either to contract for the services or use private markets, if they owned and operated a landfill or waste-to-energy incinerator. The ownership and operation of a materials recovery facility also increased the likelihood of government provision of recyclables collection.[62]

60. If the municipality from which the waste is collected does not own a disposal facility, then the question is whether effective competitors in the collection market must have their own facility, or whether it is sufficient for them to have access to a facility owned by another company, who might be a rival in the collection market. Different jurisdictions have arrived at different conclusions, as illustrated by the following merger remedy decisions.[63]

- A 2001 Canadian decision reasoned that "the small accommodations and goodwill that are required to make a long-run supply relationship work would not create the kind of climate that is desirable and necessary to restore the competitive situation disrupted by the merger".[64] In other words, the decision said that the collection company needed to own its own landfill in order to preserve competition in the market for collection after the merger.[65]

- In 2009, the US Antitrust Division explained that it did not consider the sale of 15-year contracts for space in the newly-merged firm's landfills to be in the public interest. It was concerned that

61 Further details about the design of concessions contracts generally are in Guasch 2004.

62 Walls et al. (2005)

63 Although the cases concerned small container collection from commercial establishments, there is no reason to expect different arguments were they to involve MSW collection.

64 2004 FAS 273 (2004), Federal Court of Appeal Docket No. A-389-04 2004.

65 The sale of "airspace," i.e., the right to dispose of a specified amount of waste at a specified landfill's marginal cost of disposal, was rejected as not constituting a legal remedy under the Competition Act.

granting regulated access would interfere with a landfill owner's ability to manage and operate the assets successfully, thus jeopardizing the competitive significance of the landfill assets. Rather, it was, "[I]mportant that a divestiture include all assets necessary for a purchaser to be an effective, stand-alone long-term competitor." Airspace in certain geographic markets was divested for a transitional period until buyers had arranged a permanent solution.[66] Indeed, the assets that had to be transferred as a remedy in the Republic-Allied Waste merger, i.e., that were necessary for an independent competitor, included transfer stations, landfills, air rights, rights, permits (for example environmental), contracts (for example, with service providers), accounts, and trucks and other vehicles.

- A 2013 Canadian decision, in contrast with the 2001 decision reported above, found that the sale of 20-year contracts for space in a particular landfill would allow the buyer of the rights to effectively compete.[67]

61. When both integrated and unintegrated firms bid for a collection franchise, then their offers reflect their respective estimates of the cost of access to a facility. Non-discriminatory access would promote outcomes in which the most efficient collection firm wins the tender. It is not uncommon for waste transfer stations, landfills and incinerators to be required to offer third-party access or to be owned by the municipality or group of municipalities. Nevertheless, the large firms who own disposal facilities indicate that there are advantages to vertical integration between collection and disposal.[68] They did not specify what these advantages might be, that is, whether they arise from greater efficiency, better coordination and better information about the waste, or were purely pecuniary. The OFT (2006) had seen no evidence to suggest significant scope economies between collection and treatment or other services. [69]

62. The absence of competitive neutrality between municipalities and private firms can result in less efficient bidders winning the contracts. This may discourage private bidders from participating. An increase in the number of credible bidders greatly increases the efficiency effects of tenders.

63. The OECD Competition Committee has discussed competitive neutrality in 2009. The discussion brought to light two instances where efforts were made to improve competitive neutrality in waste management.[70] One was in Finland where, following complaints as well as the adoption of the *Destia* decision by the European Commission,[71] the Ministries of Finance and Environment established a working group to investigate competition neutrality in waste management. The working group proposed various changes, including pricing access to the municipal waste disposal sites on a commercial basis. Another instance was in Norway where Bergen's municipal waste management company was obliged to separate

66 Antitrust Division (2009) Part III.A.2.c and d

67 Canada Bureau of Competition (2013)

68 Republic (2013), p. 3; Waste Management (2013), p. 6

69 OFT 2006 p37.

70 OECD (2009)

71 Commission Decision of 11 December 2007 on the aid No. C 7/06 (ex NN 83/05) implemented by Finland for Tieliikelaitos/Destia, 2008/765/EC, OJ L 270/30 10.10.2008. The decision found that non-coverage by the bankruptcy law and exemption from corporate income tax law constituted state aid to a road-building company. The decision was reached despite the fact that Finland imposed a guarantee fee for loans raised or debts incurred (paragraphs 277-8) and extracted profits meant to approximate the corporate income tax and dividends paid by competitors (paragraphs 282-284).

the corporate governance of the part engaged in the provision of monopoly services from that of the part engaged in the provision of competitive services.

64. Among the possible sources of non-neutrality between municipalities, or their companies, and private companies are different treatment under bankruptcy law, different treatment under corporate income tax law, and different tax treatment of their financing. Each of these lowers the cost of capital of these companies.

65. Participation to the tender can also be discouraged when it the bid is for running the existing collecting company, with its employees, facilities, contracts (for example, with service providers), trucks and other vehicles. This can happen when a municipal company existed and the introduction of competitive tendering does not allow dismantling it.

3. Waste transfer stations, landfills and incinerators

66. The markets for waste transfer stations, landfills and incinerators are quite different from those for MSW collection services. These facilities exhibit scale economies, high entry barriers and the relevant assets have long lives. The geographic extents of markets are determined by transport costs and by legal rules that restrict the movement of MSW. Waste transfer stations are sited to minimize transport costs taking both collection truck and transfer truck costs into account. Hence they tend have smaller geographical markets. Landfills and incinerators, particularly those reachable by barge, instead may serve larger areas. However, "flow control" rules may limit those disposal or recovery facilities to which MSW collected from specific municipalities may be taken.

67. Waste transfer stations, landfills and incinerators are facilities that operate at larger scale than collection. Entry or expansion are costly and take several years. Partly, this is a consequence of their negative externalities they impose. A number of environmental, safety, zoning and permit laws and regulations dictate how MSW must be stored, handled, transported, processed and disposed. The regulatory requirements and local public opposition to new or expansion of landfills, transfer stations and incinerators combine to the above to raise substantial barriers.

68. The economic lifetime of these facilities is significantly longer than that of the collection trucks. Gorecki *et al.* (2010) reported that the lifetime of a large scale incinerator can range between 25 and 40 years[72]. A study by the OFT reports that incinerators last an average of 26 years and mechanical biological treatment plants 24 years.[73] Landfills operate over decades, e.g., capacity estimates are made for 20 years into the future. An estimate of the duration of contracts to build and operate waste processing infrastructure is up to 30 years.[74] Contract duration affects competition where significant costs are sunk because bidders shade their bid to account for the risk of hold-up. This risk may be significant for waste disposal facilities, whose economic lifetimes can span substantial changes in regulation.

69. The geographic scope of different waste disposal or treatment markets can vary substantially. For example, in the US these markets are small: MSW that is disposed of in landfills is transported no further than about 55 kilometres, and in congested areas it is disposed of in nearby transfer stations. MSW haulers would not substantially switch to more distant sites in response to a price hike.[75] In England, the pattern of

72 Gorecki et al (2010), p. 16

73 OFT (2006) , pp. 62, 64.

74 Veolia Environment (2013), p. 25

75 US Antitrust Division (2008)

supply of MSW treatment is regional, with one or two suppliers having a much greater share of contracts than others active in the region, and suppliers not serving other regions at all.[76] By contrast, in Europe MSW that has been sorted to be feedstock for energy efficient incinerators may be transported hundreds of kilometres, e.g., from Ireland to the Netherlands or from Italy to Germany.

70. Mergers may restrict competition in markets for landfills and transfer stations. The waste management sector in North America has consolidated over the past two decades, and at the same time as many landfills have closed.[77] A 2003 survey of US municipalities found that 43% of municipalities used the private sector for collection and hauling of residential solid waste, and 52% did so for its disposal at landfills.[78] And in 2005, the three largest firms in the market for waste handling, Waste Management, Allied Waste, and Republic Services, accounted for two-thirds of total revenues of the US industry's 100 largest firms.[79] Note, however, that this figure refers to all waste handling activities and is not limited to MSW.

71. An example of an anticompetitive merger between landfill owners a Canadian case from 2001.[80] In this case entry into the market of disposal of solid non-hazardous waste that is generated by institutional, commercial and industrial customers in a defined geographic area was found to take several years due to regulatory processes, and entry costs were entirely sunk. The effect of transaction on shares of landfill capacity led to a finding that the merger would cause a substantial lessening of competition.[81]

72. Flow control" can restrict competition among landfills and incinerators. Flow control refers to restrictions on MSW shipments across borders, usually state or municipal borders. Controls may be imposed to require waste collected from a municipality, to be deposited in a given waste facility, such as a waste transfer station, a landfill or an incinerator owned by the municipality. The controls essentially make the facility a monopsonist. Controls may also be imposed to prohibit waste collected from outside a municipality to be disposed in the municipality's landfill.

73. Export controls can be seen as a way to guarantee the flow of feedstock to induce investment to be sunk in specific facilities, such as a district heating-incinerator complex or a landfill. But the restrictions mean that the disposal facilities need not compete for an input and face less incentive for economic efficiency.

74. Import controls can be seen as a solution to too few policy instruments: tipping fees may need to be set below the total social cost of landfill in order to discourage illegal dumping. However, pricing below total social cost induces nearby municipalities to dispose of their waste in landfills located in other municipalities, since this allows them to avoid incurring the cost of providing their own. Municipalities,

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76 UK OFT (2006), p. 68

77 The number of landfills in the US declined from over 8000 to fewer than 3000 between 1988 and 1997, while total capacity expanded. See Kinnaman (2006)

78 Macauey (2009)

79 Congressional Research Service (2007)

80 *The Commissioner of Competition v. Canadian Waste Services Holdings Inc*

81 2001 Comp. Trib.3 File no.: CT-2000-002, "Reasons and Order." Geographic market is addressed *inter alia* at paragraphs 100, 102, 107, entry at paragraphs 124-5, and effect on competition at paragraphs 204-5. http://www.ct-tc.gc.ca/CMFiles/CT-2000-002_0059a_49PXE-982004-5523.pdf.

however, could impose "host fees" to equilibrate the private cost and social cost of "non-local" waste, and thus eliminate the need for import flow control. [8283]

75. Flow control has been found to violate the competition laws of both Lithuania and Poland. In Lithuania, the Competition Council found in 2008 that municipalities had violated the competition law by assigning regional waste management centres the exclusive right to recover and dispose of MSW, without following a competitive procurement procedure. This constituted discrimination by public and local authorities against other undertakings capable of providing identical services.[84] In Poland, several municipalities had forced firms active in the local waste collection market to dispose of the waste exclusively in the municipal landfill.[85]

3.1. Markets for incineration

76. Incineration converts feedstock into heat, carbon dioxide, water, and bottom ash. The resulting heat may be sold for district heating or industrial uses, or used to generate electricity.

77. Incineration exhibits economies of scale, with unit costs falling as more waste is processed. Hence costs increase significantly if less waste is processed than the plant was designed for. Waste with a higher calorific value generates more heat or electricity. Since incinerators are too small to affect downstream market prices, more output means more revenue. Therefore, incinerator owners prefer waste with a higher colorific value, other things equal. Higher emissions standards raise costs, as do higher costs of disposal of residues from flue gas cleaning.[86]

78. An incinerator's technology, and hence its level of energy efficiency, affects the geographic area over which it might compete.[87] To oversimplify, in the EU regulatory framework, the waste a plant uses as feedstock is categorized as "waste for recovery" if the plant meets a given energy efficiency level, but is categorized as "waste for disposal" if the plant does not. And only "waste for recovery" may be transported across borders. By contrast, many countries prohibit the import of "waste for disposal." But the prohibition is not universal: Some countries no longer restrict trade in "waste for incineration", which is a broader category than waste for recovery".[88]

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82 Kinnaman (2006) found that "host fees" in 26 municipalities in Pennsylvania in the US averaged USD 4.05/ton, which is approximately the size of the estimated decline in the value of nearby housing of USD 3.05 to 4.39. Ley, et al. (2000) simulated the effects of various policy proposals for flow controls in the northeastern U.S. They found that flow control would reduce economic welfare, and predicted that import surcharges would reduce welfare by less than volume restrictions.

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84 OECD (2009), p. 266; Lithuania Competition Council (2008)

85 Idem (2009), p. 196)

86 World Bank (1999)

87 Advanced thermal treatment of two types, pyrolysis and gasification, generate a synthetic gas, which is then used to generate sellable energy, and other outputs. For the purposes of this paper, advanced thermal treatment is considered with incineration.

88 Norwegian Ministry of Finance (2010); (2010b)

79. Major importers of waste for incineration in Europe are Germany, Sweden, the Netherlands and Belgium.[89] The inconsistent, incomplete and out-of-date data on intra-European trade in waste show that about 1,183,848 tonnes of wastes collected from households and residue arising from the incineration of household wastes were exported from all EU member states in 2009, with Italy accounting for nearly a third, and about 635,541 tonnes were imported, with Germany accounting for three-quarters.[90][91][92]

80. The Netherlands offers an example of a more liberalized market for incineration, and hints at the magnitude of the effect of restrictions on international trade. "[I]n recent years…an explicit choice has been made to deregulate the incineration market. The objective of this is to gain more incineration capacity and more competition in that market in the Netherlands."[93] Unsorted combustible residual waste is increasingly used. (op cit., p. 20) By 2011, the Netherlands imported about 300 kilotonnes of combustible waste for incineration, five times the 2010 figure, and had already imported 350 kilotonnes in the first six months of 2012.[94]

81. Government policies can significantly increase demand for incineration. For example policies can promote demand for downstream products: In Sweden district heating has been promoted and now 20% of it is provided by incineration plants. About half of MSW in the country is treated in incinerators with energy recovery.[95] Other policies can suppress demand for substitute. An outright ban of landfilling combustible waste increases demand for incineration. The exemption of auto-generation from taxation and other electricity fees, and from green certificate obligations provides incentives on industrial firms to use waste incineration to generate heat and electricity. Demand for incineration falls when greater incentives are offered for recycling waste fractions that may be either recycled or incinerated.

82. Government policies may also affect competition in the market for incineration. Norway exports waste for incineration to Sweden. Sweden had decided to eliminate a tax on incineration. In response to concern that Norwegian incinerators would offer prices so low as not to cover their full, long-run costs, Norway eliminated its incineration tax on 1 October 2010, the same date as Sweden did so. An alternative response to the announced Swedish tax change, an export ban on waste, was considered. But it was rejected on the basis of legal advice that such a ban would need to based on environmental grounds, which it was felt could not be applied to Sweden. (Norwegian Ministry of Finance 2010; 2010b)

83. Apparent excess capacity generated demands for intervention in Europe. [96] One response was a reminder of the legal basis on which imports of waste for energy recovery may be denied. Other observers

89 Reuters (2012)

90 Reported exports of hazardous waste were 27% higher than reported imports in 2009, and for other notified wastes—MSW and residue from the incineration of MSW—reported imports exceeded reported exports by 36%. Some countries submitted reports too late to be included.

91 Reported imports of MSW and residue from the incineration of MSW exceeded reported exports by 36%. Reported exports of hazardous waste were 27% higher than reported imports in 2009. Some countries submitted reports too late to be included.

92 European Commission Staff (2012), tables 11, 32

93 Netherlands Ministry for Housing, Spatial Planning and the Environment (2008), p. 13

94 Dutch Waste Management Association (2012)

95 IEA Bioenergy (2012).

96 A European parliamentary question concerned over-capacity. (E-010851-12 of 29 November 2012) According to *inter alia* Suez Environment, there is now significant overcapacity in the incineration market in Europe. (Suez Environment 2012, p. 58)

pointed out that excess capacity would lead to exit of older, less efficient, plants.Flow control between municipalities can restrict competition in the incineration market. If some combustible waste holders have a choice of incinerators and other combustible waste holders are required to use an assigned incinerator, then in general the waste holders facing competition will pay a lower price. One study found that the average price charged for combustible waste for which there was competition was less than half that of prices charged for similar waste subject to a monopoly obligation.[97]

84. The next section turns l to markets for product take-back schemes that enable material to be re-used and recycled.

4. Producer responsibility schemes

85. Extended producer responsibility means that the producer or importer is responsible for the products it has put on the market at the post-consumer stage of the products' life[98]. The focus here is on product take-back systems, where the waste is physically taken back from consumers. Packaging waste, electrical and electronic equipment and batteries/accumulators have, among other types of waste, been subject to take-back obligations. Processing of the waste yields *inter alia* secondary raw materials. In order to generate demand for these materials, waste-specific targets for recycling or recovery complement the assignment of responsibility. To further ensure that the waste does not leak out of the recycling scheme, untreated disposal of waste subject to extended producer responsibility is often prohibited.

86. Responsible parties have a variety of choices as to how they fulfil their obligations. They may do so individually, or by participating in a producer responsibility scheme ("PRS") along with other responsible parties, or by buying the service from third parties. Although markets for third party services may suffer from anti-competitive regulation, the main focus of this section is on PRSs. Since they involve collaboration among product market competitors and exclusive agreements with service providers, these schemes can restrict competition.[99]

87. PRSs impose fees on their member that should reflect the net cost of handling the waste. In principle, the income from this fee and the sale of the secondary raw materials should pay the cost of the system.[100] The fees are intended to shift the cost of handling waste from municipal rate-payers to

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97 Hjellnes Consult Report of Federation of Norwegian Industries (2013)

98 The OECD guide on EPR defines it as "a policy approach under which producers accept significant responsibility - financial and/or physical - for the treatment or disposal of post-consumer products. Assigning such responsibility could provide incentives to prevent wastes at the source, promote product design for the environment and support the achievement of public recycling and materials management goals" (OECD 2010)

99 A PRS may be a company or a joint venture. Duales System Deutschland (DSD), for example, began as a syndicate owned by over 400 retail and packaging firms and several large waste-hauling firms. It was subsequently sold to the private equity firm Kohlberg Kravis Roberts in 2004. In European Commission (2005), the PRS were described as including systems based on agreements among participants in entire industries. Some had significant commercial independence and others were subject to a "coordinating cross-sector 'holding' organisation."

100 Whether income covers cost in practice is unclear. A recent study found that three of 24 packaging producer fee schemes (eight of 25 WEEE schemes) in EU Member States covered their costs, and the situation was unclear for the remaining 21 packaging waste schemes. (Bio intelligence service 2012, pp. 6-8) Fees set too low weaken the incentives to lower waste handling costs. Insufficiently differentiated fees weaken firms' incentives to lower the waste handling costs of their particular products. The cost of administering the fee system likely rises with complexity, limiting differentiation.

consumers. One of the original objectives of PRSs was to provide incentives for re-design for recycling. Thus, at least for those PRS that deal with packaging, the amount of the fee depends on the amount and type of packaging the "responsible party" puts on the market.[101]

88. PRSs typically contract with firms for the collection, sorting and recovery of the waste rather than perform these tasks themselves. Those PRSs that specialized in consumer packaging waste typically must contract with firms to collect house-to-house (as it is done with unsorted MSW). Collection of other waste may be from fewer, larger pick-up points, such as specific containers or retailers who take-back discarded electrical and electronic equipment, car tyres, batteries, and other hazardous waste. Sorting may be done by different contractors or it may be bound up with the collecting activity.

89. Thus, a number of markets are related to the fulfillment of extended product responsibility for waste of a given type:

- the organization of solutions to fulfill the extended producer responsibility obligation;
- the collection of the waste- there may be different markets depending on how the collection is performed, e.g. whether it is directly from households, from commercial establishments, or from specialized containers;
- the sorting of the waste - there may be different facilities specialized in different sorting tasks;
- the recovery of the waste;
- the sale of the secondary raw materials derived from the waste.

90. These markets have different geographic scopes. Whereas the markets for collection are usually local, the markets for sorting, recovery and sale of the secondary raw materials can be much wider, even international. [102]

4.1. Effects on product market competition

91. PRSs may initially be formed as a monopoly, with the exception of those responsible parties that decide to fulfill their obligations independently. As monopolies, PRSs bring together competitors into a cooperative structure, albeit limited to fulfilling waste obligations. As all those structure that allow repeated contacts between competitors, monopolistic PRSs may have an impact on competition in the product market.

92. Information exchange through the PRS may yield better intelligence about competitors' sales than would otherwise be available, for example, if the amount of a particular type of packaging waste were

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101 Shifting the cost of waste management and differentiating the fees to reflect the different costs was intended to give consumers incentives to choose product-plus-packaging systems with lower lifetime costs, since in principle lower waste handling costs are reflected in lower fees and lower product prices. In turn, producers are incentived to redesign their packaging to lower the cost of waste handling. But research by the Dutch Ministry for Housing, Spatial Planning and the Environment in 2007 found that the insufficiently differentiated system meant that there was no incentive to re-design for recycling. Subsequently, other, more specific policy instruments have been introduced such as the Eco-Design directive and prohibitions on the use of lead and other hazardous substances in electronic products. (Netherlands Ministry for Housing, Spatial Planning and the Environment 2008, pp. 44-5)

102 Since countries may restrict or prohibit trade in waste, it is important for the materials derived from waste to no longer qualifying as waste.

closely correlated with current market sales. However, waste that appears long after the initial purchase, e.g., electrical and electronic equipment, car tyres or car batteries, may have no informational value for market monitoring. Waste associated with many different products may similarly have no informational value.

93. Participation to a PRS may reduce price competition as members of the scheme may agree on the fee to charge consumers for waste handling. A similar concern would arise if the PRS fee, even if not charged separately, represents a large part of the final price. In this case, if the PRS is a monopoly, then the waste fee would increase the commonality of cost among rivals. That is, there would be less scope for competition to lower costs.

94. The competition effects of PRSs requiring participants to show separately the waste disposal levy on bills to the final consumer have been examined several times. In the 1992 VOTOB decision, the European Commission found that a waste management agreement among independent tank storage companies that established a fixed fee, separately listed on invoices, had the effect of excluding competition on an important cost component.[103] The Dutch competition authority reports that it has, in most instances, prohibited the practice of separately invoicing the handling fee by PRSs, arguing that the practice constitutes price-fixing and that consumers do not share fairly in the benefits. However, in the white and brown goods case, the authority made an exception after appeal of its initial rejection and the entry into force of the European Directive on waste electrical and electronic equipment, which offered the option of showing an explicit levy. The authority also allowed a EUR 45 disposal fee for cars to be passed onto consumers on the basis that the fee was very minor in comparison with the total price of a new car.[104]

95. The structure of the waste fee may harm competition in product markets as well as the market for PRSs. For example, the structure of fee charged by the Duales System Deutschland ("DSD") was found to be an abuse of dominance. At the time, DSD charged customers according to the volume of packaging bearing the Green Dot trademark rather than according to the volume of packaging for which DSD provided the take-back and recycling service. The European Commission felt that, due to this provision, manufacturers and distributors would not contract with DSD's competitors, since doing so would not reduce the amount paid to DSD, given that the total amount of packaging would remain unchanged. DSD modified its pricing formulae to comply. This fee structure would also raise barriers to entry into the German market by foreign producers that mostly sold outside the country The requirement to bear the Green Dot symbol combined with scale economies in using a single form of packaging, which arise if for example a firm has a single production line, would make it costly for the producer to supply small quantities to German consumers.

4.2. Competition among PRSs

96. Competition among PRSs can yield significant efficiencies. An example is packaging PRSs in Germany. Changes in the rules knitting together DSD resulted, over time, in increased vertical separation and the opening up of the market for packaging PRSs in Germany. Whereas in 2003 DSD was the monopolist, by 2011 entry into the market for PRSs had eroded its national market share to 44% and costs of PRSs had fallen from about EUR 2 billion in 2003 to less than EUR 1 billion in 2011. In addition new technologies had been developed and deployed, for example, for sorting lightweight packaging.[105]

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103 European Commission (2005), para 59

104 OECD (2010), p. 76, OECD (2004), p. 139, Netherlands Authority for Consumers & Markets (2003)

105 German Federal Cartel Office (2012)

97. A 2006 study of PRSs for waste electrical and electronic equipment does not report empirical evidence on the effect of different structures. [106] The study argues that monopoly enables the exploitation of scale economies and the avoidance of the costs of a national clearinghouse and of separate collection containers. But it shows that competition between multiple suppliers keeps down costs and incentivizes the discovery of efficient, tailored solutions. The study reports that different EU countries have different market structures: at the time there were five to six schemes in the United Kingdom, France, Hungary and the Czech Republic, and a single national scheme in a number of other EU countries.

98. The documents accompanying a 2013 consultation by the UK Department for Business Innovation and Skills on the regulation of waste electrical and electronic equipment illustrate that having multiple schemes do not guarantee effective competition.[107] There are 37 PRSs for this kind if waste in the UK. However, manufacturers complain that charges are high, and few large manufacturers have switched between schemes. The Department for Business Innovation and Skills attributes the high prices to the design of the existing regulation. In particular, it argues that the obligation to collect and treat 100% of eligible waste and the criminal sanctions imposed on manufacturers that fail to meet their regulatory obligations generate a high willingness to pay. The Department attributes the low switching rate to the different schemes charging similar fees and imposing onerous exit clauses, and claims that the existing regulation provides disincentives for schemes to attract new manufacturers. The consultation documents suggest possible changes that would address these anticompetitive restrictions.[108]

99. Free riding is one of the arguments schemes make against competition. [109]Where enforcement is lax, manufacturers and importers may find it profitable to free-ride on the firms that do comply with their EPR obligation and reduce their costs, thus distorting competition in their favour.

100. Free-riding had been a significant problem in the early days of the German packaging scheme: The system nearly broke down in 1993 when, DSD estimated, a license fee had been paid for only 55 to 60% of all packaging bearing a Green Dot™ symbol, even though only packages for which the producer had paid into the system could have the symbol. Loans, contract renegotiations, and amendment to the Packaging Ordinance to encourage membership in the DSD system helped to improve the financial situation. Also, DSD gained the right to levy fines when the Green Dot™ symbol was used without payment of the license fee. Sufficient likelihood of detection and appropriate penalties can shift the free-riders' calculations and ensure compliance.

101. Some PRSs require participants to transfer all their obligations to a single system, that is the responsible parties may not use a PRS to handle only part of their obligations. This practice can raise barriers to entry into the market for PRSs, since entrants may be unable to provide the entire range of necessary services as soon as they enter. Nevertheless the EU has regarded the practice as "necessary to encourage vital investment in…collection and recycling infrastructure," but it would no longer regarded it with such leniency if recovery and recycling targets had been reached.[110]

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106 European Commission DG Joint Research Centre (2006)

107 United Kingdom Department for BIS (2013)

108 The changes involve reduced regulatory requirements on small producers of EEE and giving collectors of WEEE the option to manage their own WEE streams. Other changes discussed would introduce a compliance fee to replace the quantitative requirement for evidence of compliance. The relationship between these changes and the predicted outcome is explained in the cited document.

109 Pro Europe (2012)

110 European Commission (2005), para.s 72-75

102. Despite their possible harmful effects, some schemes have been established as monopolies as there may be no less competitive harmful means to achieve the public policy goal with respect to the waste concerned. Indeed a monopoly may be necessary in order to aggregate demand to exploit scale economies or to give incentives for sunk investments. In Sydhavnens Sten & Grus[111] the state had assigned an exclusive right to receive building waste and the ECJ recognized that it was acceptable as waste management may constitute a service of general economic interest.

4.3. Competition among PRSs and related markets

103. PRSs often do not provide the collection, sorting and recovery services themselves, but rather contract for these services. When one market is a natural monopoly or has a large minimum efficient scale, then exclusive contracts may reduce competition in other markets as well. In particular, exclusive contracts may force new entrants to enter two markets simultaneously, or to operate below the minimum efficient scale in some markets, which may too costly and thus discourage entry. For example, a PRS that signs exclusive agreements with service providers in natural monopoly markets can foreclose entry by competing PRSs.[112]

104. A number of the services for which PRSs contract may be natural monopolies, or may have relatively large minimum efficient scales:

- The collection of recyclables, such as packaging waste, from households may be a natural monopoly. A study found evidence that the presence of economies of density had a similar effect on local governments' choice between having a single or multiple collectors of recyclables and MSW from households, which was consistent with the authors' expectations that the economies of density of the two services were similar. (Walls et al. 2005)[113] [114]

- Plants that sort co-mingled recyclables enjoy economies of scale, and the costs of getting planning permission further increase scale economies. (OFT 2006, p. 58) With sufficiently high transport costs, this would imply local natural monopolies.

- Whether recovery plants are natural monopolies turns on the volume and the scale economies of the specific industrial process. The discouragement of international trade in waste means that countries with small populations are more likely to have natural monopolies in recovery.

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111 Case C-209/98, *Entreprenørforeningens Affalds/Miljøsektion (FFAD) v Københavns Kommune*, judgment of the ECJ of 23 May 2000, ECR [2000] I-3743.

112 The idea is that, for a PRS to have sufficiently low costs to be able to compete in the PRS market, it must have collectors that reach minimum efficient scale. But if the collection market is a natural monopoly, then at most one firm could reach minimum efficient scale.

113 Since research has found kerbside collection of unsorted MSW to be a natural monopoly, it would relevant to know whether there are scope economies between kerbside collection of unsorted MSW and of recyclables. However, the author did not find research on this issue. Collection trucks with multiple chambers may collect simultaneously both types of waste. Such a truck exhibits scope economies, but its scale would necessarily be smaller. Other localities collect the different waste types in one run for sorting later. Yet other localities collect different types of waste on different runs, a practice that would seem to yield scope economies only from common vehicle depots.

114 Walls et al. (2005)

105. The introduction of competitive tendering to choose the providers of collection, sorting and recovery services has led to significant cost savings for PRSs. However, the success of tenders in delivery cost savings depends on how the competition is run.

106. Competition authorities have found that excessively long exclusive contracts signed by PRS may harm competition in the collection markets. The EU Commission viewed the duration of DSD's exclusive agreements with local collecting companies in the 546 collection districts in Germany, of up to 15 years, as excessive.[115] The cumulative effect of the long contracts meant that the minimum efficient scale was larger than the number of contracts available at any one time. This created barriers to entry for domestic and foreign collecting companies. Contract duration was reduced to four years. The EU reached a similar decision in *Eco-Emballages*.[116] In this case, the scheme had to reduce contract durations to one year, with local authorities able to terminate them immediately, and to limit coverage to some or all of the collected packaging. The changes were intended to facilitate entry by competitors into the French packaging PRS market.[117]

107. The introduction of competition for collection and sorting services for DSD, partly in response to prompting by the German Federal Cartel Office, resulted in reductions in the cost of those activities by more than 20%. In 2003, collection was vertically separated and DSD conducted auctions for contracts in some areas. Following a poor response, DSD modified the conditions to improve the prospects especially for small and medium-sized disposal companies and conducted further auctions, covering almost half its contract areas, in 2004. The two sets of auctions resulted in the cost savings reported.[118]

108. A 2006 review on PRSs for waste electrical and electronic equipment showed that in the Netherlands the schemes that used multiple recyclers and transport firms, chosen by competitive tender, reported lower costs than those that had chosen a single supplier. [119] The introduction of competitive tendering reportedly also contributed to the development of new recycling technologies, suggesting that large scale guarantee of demand helped to overcome entry barriers.[120].

109. Efficiency defences for exclusive agreements are usually based on their incentivizing firms to incur sunk costs, but another justification for exclusive agreements is based on the "market for lemons" argument. The idea is that the material collected is heterogeneous and can have a very different value . Hence, if the collector is able to sort the material into more and less valuable fractions and the PRS cannot cheaply audit what it receives, the collector may sell the high value material directly on the market and send only the low value one to the PRS. Since the PRS usually pays the collector on the basis of average quality of the material delivered, it would end up paying an excessive price. An exclusive agreement requiring all collected material to be delivered to the PRS would eliminate the possibility for the collector to discriminate in the material delivered. Provisions in the contracts between DSD and the local collecting

115 EC 2005, para. 65.

116 EU Commission decision of 15 June 2001, *Eco Emballages*, OJ 2001 L 233/37

117 There are other Commission decisions concerning PRSs, e.g., Decision of 16 October 2003, *ARA, ARGEV, ARO*, OJ 2004 L 75/59.

118 OECD (2006), p. 125-6

119 European Commission DG Joint Research Centre (2006), p. 38

120 Veerman in OECD (2004), p. 145

companies had prohibited the companies from marketing the collected materials themselves. This was changed following discussions between the scheme and the European Commission.[121] [122]

110. The contracting practices of PRSs may distort competition in related markets. For example, discrimination in tendering for collection and recovery services by the Spanish glass packaging scheme, Ecovidrio, led to anticompetitive outcomes. The concern was that vertically integrated firms were able to coordinate and exclude competitors that were active only in the provision of collection or recovery services. Although the competition authority required Ecovidrio to apply objective, transparent and non-discriminatory conditions on the competitive tenders for contracts for these services, in 2010 the authority found that the scheme had violated this condition, favouring firms that were members.[123]

111. Arrangements for the allocation to recovery companies may also impede competition among schemes.

- In the DSD system, recyclers initially received the sorted material from DSD at no cost. DSD then modified its system to charge recyclers when the market price of the material provided was positive, and to allow the sale of recyclable materials outside the scheme, provided rebates were paid to DSD.

- The Italian PRS for glass packaging, COREVE, used to allocate recovered glass to users according to their historical product market share at a price set by the scheme. The Italian competition authority argued that the allocation method did not allow entry by new users nor changes in shares, and that the administrative price did not reflect market price.[124] The PRS changed its allocation method to a system of auctions. Consequently, the price rose to reflect the market value of the recovered glass and included demand by those that had been excluded from the previous allocation method.

- German manufacturers of container glass had jointly established a monopsony for purchasing glass recovered from household collections in connection with the establishment of the German scheme for packaging waste in 1993. Container glass uses a large fraction of secondary glass. In 2007, the German Federal Cartel Office found that, since the quotas for recycling of glass had long been met, the agreement amongst container glass manufacturers was not necessary to achieve the environmental goal. It thus prohibited the joint purchasing.[125]

- The allocation rules of an industry-wide consortium for the recovery and recycling of lead batteries in Italy raised concerns that it would maintain market shares among smelters, reduce incentives for greater efficiency in recycling, and raise barriers to entry by rival collection systems once the initial exclusivity exemption expired.[126]

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121 EU Commission Decision of 20 April 2001 relating to a proceeding pursuant of Article 82 of the EC Treaty (Case COMP D3/34493 - DSD) 2001/463/EC OJ L 166/1-24 of 21.6.2001.

122 European Commission (2005), para. 65

123 OECD (2010), pp. 85, 142

124 Autorita Garante per la Concorrenza ed il Mercato, (2008)

125 Annual Report on Competition Policy Developments in Germany, DAF/COMP(2007)24/01

126 OECD (2010), pp. 64-5,140-1. The competition authority's decision against these provisions was recently upheld by the higher court

- In Turkey, two schemes were set up for the collection and recycling of lead from accumulators, one by the producers and recycling firms and the other, much smaller, by importers. The larger scheme had agreements with dealers and distributors that prevented them from selling used accumulators to collectors acting on behalf of the other scheme. In addition, member recycling firms were banned from buying used accumulators from collectors acting on behalf of the other scheme. The prohibitions meant that the schemes could not compete in providing recovery services. [127]

112. In addition to the effects of the PRSs, restrictions on international trade in secondary raw material may distort markets for secondary raw materials

113. Product standards may also facilitate or impede competition. Secondary raw materials are heterogeneous and there are incentives to misrepresent the true quality of the product. For example, green glass from containers is less valuable than clear glass, and glass with more impurities has a lower value and at some point, quality is too low to elicit any demand. Consequently, standards are established. Standards may give incentives to improve processes to yield higher quality products that command higher prices. If standards are credibly enforced, so that market transactions may take place and different recovery companies offer substitute products, then competition may develop.

114. PRSs form an important link in material flow in modern societies because they ensure that a given share of the products that have been put on the market are reused, recycled or recovered. Just as efficiency in manufacturing and in distribution can increase consumer welfare, so too does greater efficiency in closing the material flow. Monopolies have less incentive to seek more efficient suppliers than do competitive schemes, despite members having incentives for the schemes to be efficient.[128] The network of agreements within PRS can have anticompetitive effects, foreclosing entry by rival PRSs and excluding competition in the markets for collection and recovery, and poorly designed regulation can discourage competition among third parties providing the integrated collection and recovery services.

5. Conclusions

115. Despite the highly-regulated nature of the waste management sector, competition can still provide incentives for efficiency. Greater efficiency reduces the cost of getting something of value from waste or of disposing of it without environmental damage.

116. Transport costs are important in the sector, and thus geographic markets can be small, even local. International rules and national laws can also restrict the size of markets through discouraging, and even prohibiting, international trade in many types of waste. Given the limited geographic extent of markets, competition is particularly exposed to distortion from local regulation. Flow control — barriers to the transport of waste — is an example. Access to local facilities, such as waste transfer stations or landfills, are necessary to compete in the market for MSW collection services, but there is not agreement on whether

127 OECD 2010, p. 143

128 Members of PRSs have incentives to reduce the systems' costs. While this may be self-evident, the extent to which consumers would resist having this cost passed onto them is perhaps surprising. Procter & Gamble has researched consumer attitudes towards the tradeoff between environmental sustainability and product performance or value. Some 70% of consumers will not sacrifice performance or value for greater sustainability but prefer product choices to have environmental improvements. About half the remaining consumers (15%) are willing to make the tradeoff, and the other half (15%) do not make purchases based on sustainability. The differences were not great between consumers in the US, Japan and Europe. Procter & Gamble (n.d.).

access to a competitor's facility would enable effective competition from those firms that are not vertically integrated into disposal facilities. Economies of population density make collection of MSW a natural monopoly. Where transactions costs are high, then municipal provision of MSW collection may incur lower cost than the choice of provider through competitive tender. But some observers express concern that remunicipalization of MSW collection may be due not to transaction cost considerations, but to the desire to enhance municipal revenue.

117. A second set of competition issues concern schemes that collect, sort and reuse or recycle waste subject to extended producer responsibility. These schemes may be organized to impose a network of exclusive vertical agreements and monopolies. Experience has shown that, at least for some waste streams, competition among these schemes gives incentives for efficiency. Such competition presupposes vertical separation and non-exclusivity so that, for example, waste collectors and sorters have a choice of recovery companies. For competition among these schemes to be effective, is also important that responsible parties can be able to compare the schemes' offers and to switch schemes.

118. Competition advocacy can play an important role in waste management. It could assist in the design of policies to attain environmental objectives efficiently, while helping to protect market competition from inadvertent negative spillovers. Examples of such spillovers are increased homogeneity of costs or design, and a greater likelihood of collusion from repeated contacts and information exchange. It is often difficult to quantify the dynamic efficiency effects of competition, but the stunning decrease in costs achieved by PRSs exposed to competition and the costs savings achieved through the introduction of tenders for collection and disposal of MSW are a powerful argument for the effects of competition. There is a long-standing argument on whether and when competition can spur innovation, but it seems that in waste management competition can definitely promote innovation.

REFERENCES

Antonioli B., and M. Filippini (2002), "Optimal Size in the Waste Collection Sector", *Review of Industrial Organization*, 20, 239-252.

Antonioli, B. and A. Massarutto (2012), "The Municipal Waste Management Sector in Europe: Shifting Boundaries between Public Service and the Market", *Annals of Public and Cooperative Economics* 83:4, 505-532.

Autorita Garante per la Concorrenza ed il Mercato (2008), INDAGINE CONOSCITIVA RIGUARDANTE IL SETTORE DEI RIFIUTI DA IMBALLAGGIO (IC 26).

Basel Convention, Secretariat of the (2010), "Waste without frontiers", www.basel.int.

Basel Conventien, Secretariat of the (2012), "Technical Guidelines on Transboundary Movements of Hazardous Wastes Destined for Recovery Operations", http://www.basel.int/Portals/4/Basel%20Convention/docs/meetings/sbc/workdoc/old%20docs/guidelns.pdf.

Bio intelligence service (2012), "Use of economic instruments and waste management performances Final report for European Commission DG ENV Unit C2", ec.europa.eu/environment/waste/pdf/final_report_10042012.pdf.

Blumenthal, K. (2011) "Generation and treatment of municipal waste", *Eurostat: Statistics in focus* No. 31, Environment and energy.

Canada, Bureau of Competition (2013), Press release "Agreement Reached to Preserve Competition for Waste Disposal Services in Western Quebec", 6 February.

Confederation of Paper Industries (2012) Press release: "UK Paper Industry Calls for U-turns in Manufacturing Policy", 18 September.

Congressional Research Service, US Library of Congress (2007), "Interstate Shipment of Municipal Solid Waste: 2007 Update", RL34043.

Danish Ministry of the Environment, Environmental Protection Agency (2010), "Executive Order 1618/2010 on shipments of waste, of 15 December 2010", www.mst.dk/NR/rdonlyres/D1240722-1F07-49AA-B00F-F856BC5FE843/0/ExecutiveOrderonshipmentofwaste16182010.pdf.

Dijkgraaf, E. and R.H.J.M. Gradus (2007), "Collusion in the Dutch waste collection market", *Local Government Studies*, 33:4, 573-588.

Dijkgraaf, E. and R.H.J.M. Gradus (2008), "Comments: Per-Unit Garbage Charges", *Journal of Economic Perspectives* 22:2, 243-6.

Dijkgraaf, E. and R.H.J.M. Gradus (2011) "Efficiency Effects of Privatising Refuse Collection: Be Careful and Alternatives Present", *Tinbergen Institute Discussion Paper* TI 2011-156/3.

Dutch Waste Management Association (2012), "Recycling benefits from combustible waste imports".

EFTA Surveillance Authority (2013), "State Aid: New rules concerning the financing of municipal state collectors approved", PR(13)37, 2 May.

Eunomia (2002), "Costs for Municipal Waste Management in the EU: Final Report to Directorate General for the Environment of the European Commission".

European Commission (2012), Commission Staff Working Document accompanying "Report from the Commission to the Council and the European Parliament on the implementation of Council Regulation (EEC) No 259/93 of 1 February 1993 on the supervision and control of shipments of waste within, into and out of the European Community, and on the implementation of Regulation (EC) No 1013/2006 of 14 June 2006 on shipments of waste Generation, treatment and transboundary shipment of hazardous waste and other waste in the Member States of the European Union, 2007-2009 (Part I)", COM(2012) 448 final.

European Commission, DG Competition (2005), "Concerning Issues of Competition in Waste Management Systems".

European Commission, DG Joint Research Centre (2006), "Implementation of the Waste Electric and Electronic Equipment Directive in the EU", *Technical Report Series.*

European Environment Agency (2013), "Managing municipal solid waste", EEA Report No. 2/2013.

European Topic Centre on Sustainable Consumption and Production (ETC/SCP), Fischer, C., H. Junker, M. Mazzanti, S. Paleari, J. Wuttke and R. Zoboli (2012), "Transboundary shipments of waste in the European Union: Reflections on data, environmental impacts and drivers", ETC/SCP Working Paper No. 2/2012.

Eurostat (2012), "Environment in the EU27: Landfill still accounted for nearly 40% of municipal waste treated in the EU27 in 2010", Newsrelease 48/2012, 27 March. http://epp.eurostat.ec.europa.eu/cache/ITY_PUBLIC/8-27032012-AP/EN/8-27032012-AP-EN.PDF.

German Federal Cartel Office (2012), Press release "Bundeskartellamt presents results of its sector inquiry into compliance schemes", 3 December.

Gorecki, P.K., J. Acheson and S. Lyons (2010), "An Economic Approach to Municipal Waste Management Policy in Ireland, Final Report for Dublin City Council", *Economic and Social Research Institute ESRI Survey and Statistical Report Series, No.* 30.

Gorecki, P.K. and S. Lyons (2011), "A submission to the Department of the Environment, Community and Local Government on the Discussion Document, Altering the Structure of Household Waste Collection Markets", www.ersi.ie.

Green Dot Norway (Grønt Punkt Norge) (2013), "Vederlagssatser Grønt Punkt Norge AS for 2013", http://www.grontpunkt.no/files/dmfile/Vederlagssatser017.pdf.

Guasch, J.L. 2004. "Granting and Renegotiating Infrastructure Concessions: Doing it Right". *WBI Development Studies.* World Bank: Washington.

Handelsblatt (2013), "Bundeskartellamt: Kritik an Rekommunalisierung", 18 March.

Hjellnes Consult (2013), Report for Federation of Norwegian Industries (Norsk Industri og Maskinentreprenørenes forbund), "Waste management: Disposal of waste—Cross subsidization" ("Avfallsbehandling: Disponering av avfall – Kryssubsideiering").

IEA Bioenergy (2012), "Sweden Country Report Update 2012", ieabioenergytask36.org.

IEA Bioenergy (H. Seifert, J. Vehlow) (2012b), "Country Report Germany."

Ireland Competition Authority (2005), Case COM/108/02, "Alleged excessive pricing by Greenstar Recycling Holdings Limited in the provision of household waste collection services in northeast Wicklow," *Enforcement decision series,* No. E/05/002.

Ireland Competition Authority (2006), "Submission to the Department of the Environment, Heritage and Local Government (Response to Consultation Paper "Regulation of the Waste Management Sector") Submission S/06/007," October. www.tca.ie/images/uploaded/documents/S_06_007%20Waste%20Regulation.pdf.

Ireland Competition Authority (2011), "Altering the Structure of Household Waste Collection Markets: A Submission to the Department of the Environment, Community and Local Government," S-11-009.

Ireland Department for Environment, Community and Local Government (2012), "Regulatory Impact Analysis-Household Waste Collection," www.environ.ie/en/Environment/RHLegislation/.

Ireland Environmental Protection Agency (2011), National Waste Report 2009. www.epa.ie.

Ireland Environmental Protection Agency (2013), National Waste Report 2011.

Kinnaman, T.C. and D. Fullerton (1999), "The Economics of Residential Solid Waste Management," NBER Working Paper No. 7326.

Kinnaman, T.C. (2006), "Policy Watch: Examining the Justification for Residential Recycling," *Journal of Economic Perspectives* 20:4, 219-32.

Kinnaman, T.C. (2008), Response [to Dijkgraaf and Gradus], *Journal of Economic Perspectives* 22:2, 244-6.

Kienapfel, P. and G. Miersch (2006), "Competition issues in waste management systems", *European Commission Competition Policy Newsletter*, No. 1, pp. 52-56.

Ley, E. M. Macauley and S.W. Salant (2000) "Restricting the Trash Trade", *AEA Papers and Proceedings*, 90:2 May, 243-6.

Lithuania Competition Council (2008), Press release: "The Municipalities Obligated to Amend the Restrictive Provisions Related to the Activities of Regional Waste Management Centres", 24 December.

Low, P. G. Marceau and J. Reinaud (2011) "The interface between the trade and climate change regimes: Scoping the issues", WTO Staff Working Paper ERSD-2011-1. http://www.wto.org/english/res_e/reser_e/ersd201101_e.pdf.

Netherlands Authority for Consumers & Markets (2003), Press release: "NMa Approves Collective Levy System for White and Brown Goods", 23 June 2003.

Macauley, M. (2009), "Waste Not, Want Not", RFF Discussion Paper No. 09-11.

Netherlands Ministry for Housing, Spatial Planning and the Environment (2008), "National Waste Management Plan (LAP) 2009-2021", Version 8 December 2008, www.bipro.de/waste-events/doc/events2010/NL/National%20WMP%20Netherlands%202009-2021.pdf.

Norway Ministry of Finance (2010), Submission to Parliament "Revidert nasjonalbudsjett 2010 §3.4 Endringer i skatte- og avgiftsopplegget [Revised national budget 2010 §3.4 Changes in tax regimes]", Meld. St. 2 (2009-2010). www.regjeringen.no/nb/dep/fin/dok/regpubl/stmeld/2009-2010/Meld-St-2-2009-2010/3/4.html?id=606712.

Norway Ministry of Finance (2010b), Press release: "Regjeringa vil fjerne forbrenningsavgifta [Government will eliminate incineration tax]", 11 May, www.regjeringen.no/nn/dep/fin/pressesenter/pressemeldingar/2010/Regjeringa-vil-fjerne-forbrenningsavgifta.html?id=604491.

O'Brien, J.K. "Contracting out: Adapting local integrated waste management to regional private landfill ownership", *Waste Management World* 7:7.

OECD (2000), "Competition in Local Services: Solid Waste Management," DAFFE/CLP(2000)13.

OECD (2001), "Extended Producer Responsibility: A Guidance Manual for Governments", OECD: Paris.

OECD (2004), "Economic Aspects of Extended Producer Responsibility", OECD: Paris.

OECD (2006), "Roundtable on competition in bidding markets,"DAF/COMP/WD(2006)57."

OECD (2007), "Guidance Manual on Environmentally Sound Management of Waste", OECD: Paris.

OECD (2009), "State Owned Enterprises and the Principle of Competitive Neutrality"," DAF/COMP(2009)37.

OECD (2010), "Horizontal Agreements in the Environmental Context", DAF/COMP(2010)39.

Office of Fair Trading (2006), "More Competition, Less Waste: Public Procurement and Competition in the Municipal Waste Management Sector", Discussion Paper no. 841.

Pro Europe (Packaging Recovery Organization Europe) (2012), "Pro Europe calls for the clarification of market rules in the packaging & packaging waste management sector".

Procter & Gamble (n.d.), "Our Products Approach", in Products & Packaging, Environmental Sustainability, www.pg.com/en_US/sustainability/environmental_sustainability/products_packaging/index.shtml.

Republic Services, Inc. (2013), "Form 10-K" filed 15 February 2013.

Reuters (2012), "Sweden turns trash into cash as EU seeks to curb dumping", 26 November.

Statistics Canada (2012), "Human Activity and the Environment: Waste Management in Canada – 2012 Updated", Catalogue no. 16-201-X.

Suez Environment (2012) Reference Document 2012, www.suez-environnement.fr/wp-content/uploads/2013/04/DDR-SEC-2012-VA-05.04.2012.pdf.

Tukiainen, J. and V. Mälkönen (2010), "Jätekuljetuksen sopimusmallien yritysvaikutukset", *Finland Government Institute for Economic Research Policy Reports* 1.

United Kingdom Department for Business, Innovation & Skills (2013), "Impact Assessment of System Changes to the UK Waste Electrical and Electronic Equipment (WEEE) Regulations", 30 January 2013. www.gov.uk/government/uploads/system/uploads/attachment_data/file/186972/bis-13-764-waste-electrical-and-electronic-equipment-weee-system-impact.pdf

UNEP (United Nations Environment Programme) (n.d.) "Environmentally Sound Management of Solid Wastes and Sewage-Related Issues", unep.org.

US Department of Justice, Antitrust Division (2008), Competitive Impact Statement in *United States of America, State of California, Commonwealth of Kentucky, State of Michigan, State of North Carolina, State of Ohio, Commonwealth of Pennsylvania and State of Texas v. Republic Services, Inc. and Allied Waste Industries, Inc.*

US Department of Justice, Antitrust Division (2009) Response to Public Comments on the Proposed Final Judgment, *United States of America, State of California, Commonwealth of Kentucky, State of Michigan, State of North Carolina, State of Ohio, Commonwealth of Pennsylvania and State of Texas v. Republic Services, Inc. and Allied Waste Industries, Inc.* 14 May 2009. http://www.justice.gov/atr/cases/

US Environmental Protection Agency ("EPA") (1999), "Collection Efficiency: Strategies for Success", http://www.epa.gov/wastes/nonhaz/municipal/landfill/coll-eff/k99007.pdf.

US Environmental Protection Agency ("EPA") (2002) "Waste Transfer Stations: A Manual for Decision-Making", www.epa.gov/wastes/nonhaz/municipal/pubs/r02002.pdf.

US Department of Justice, Antitrust Division (2003), Competitive Impact Statement in *United States of America and State of Florida v. Waste Management, Inc. and Allied Waste Industries.*

US Environmental Protection Agency ("EPA") (2011), "Municipal Solid Waste Generation, Recycling, and Disposal in the United States: Facts and Figures for 2010".

US Environmental Protection Agency ("EPA") (2013), "Municipal Solid Waste Generation, Recycling, and Disposal in the United States: Facts and Figures for 2011", EPA530-F-13-001. www.epa.gov/wastes.

Veerman, K. "Revised Stand on Producer Responsibility in Waste Policy in the Netherlands", pp. 135-150 in OECD (2004) *Economic Aspects of Extended Producer Responsibility*, OECD: Paris.

Veolia Environment (2013), "Form 20-F" filed 12 April 2013.

Walls, M., M. Macauley and S. Anderson (2005), "Private Markets, Contracts, and Government Provision: What Explains the Organization of Local Waste and Recycling Markets?" *Urban Affairs Review*, May 40:5, 590-613.

Waste Management Inc. (2013), "Form 10-K" filed 14 February 2013.

World Bank (1999), "Municipal Solid Waste Incineration: Technical Guidance Report", web.mit.edu/urbanupgrading/urbanenvironment/resources/references/pdfs/MunicipalSWincin.pdf.

World Trade Organization (1998) "Synthesis Paper on the Relationship of Trade and Competition Policy to Development and Economic Growth", Secretariat Note WT/WGTCP/W/80.

World Trade Organization, Legal Affairs Division (2012), *WTO Analytical Index: Guide to WTO Law and Practice*, 3rd ed. Web-version at http://www.wto.org/english/res_e/booksp_e/analytic_index_e/analytic_index_e.htm.