



Annex 4

Capacities for handling solid waste from ships

Content

1	CAPACITIES FOR HANDLING SOLID WASTE FROM SHIPS	3
---	---	---

1 Capacities for Handling Solid Waste from Ships

In order to recover or dispose the municipal waste and non-hazardous industrial waste Regional and/or County Waste Management Centres will be established. Waste treatment operations carried out in the WMC prior to the permanent deposition of wastes to a landfill for non-hazardous waste, which is at the same time a constituent part of the WMC, are as follows:

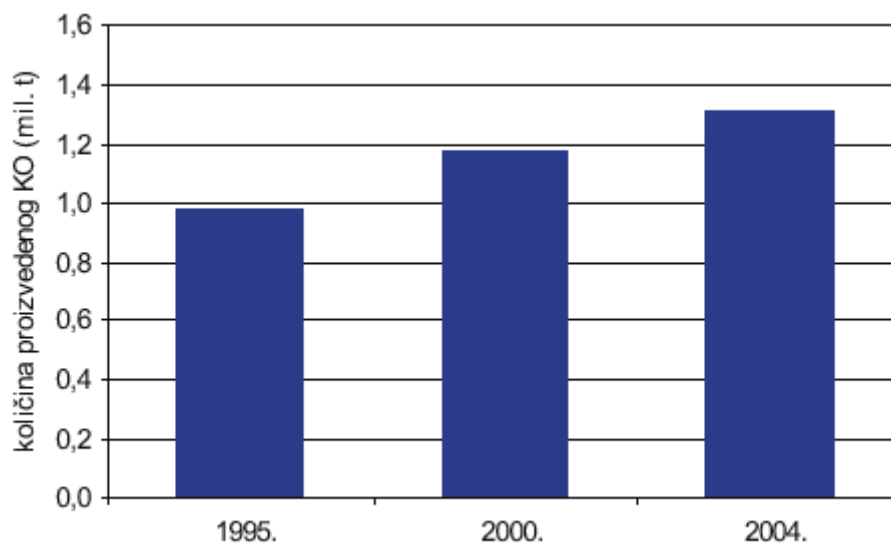
- acceptance, treatment of sorted or unsorted waste;
- collection of reusable or recyclable waste and collection and further transferring of hazardous waste;
- collection and distribution of waste that may be used for other purposes;
- energy recovery of certain waste fractions and
- deposition of treated waste.

In the WMC a combined technique will be used: Mechanical Biological Treatment (MBT). The MBT technology combines two key processes: mechanical (M) and biological (B) treatment of waste, whereby various elements of M and B processes may be configured in different ways to cover a wide range of specific goals:

- maximisation of recyclable raw material amounts (glass, plastics, paper, etc.);
- composting;
- production of energy-rich refuse-derived fuel (RDF) of defined properties;
- production of biologically stable material that can be landfilled and
- production of biogas to be used to generate heat and/or electricity.

We proposed that non-hazardous waste collected in the ports will be transported to the nearest Waste Management Centre. The question is what is the impact of this ship waste on the total amounts of waste to be operated by this nearest Waste Management Centres. Therefore we compared the volume of domestic ship waste per county with the total amount of domestic waste from citizens of that county.

The report State of the Environment of the Croatian Republic, published in 2007 by the Environmental Protection Agency provides data about the collected amounts of domestic waste in Croatia. The real amounts of waste will be higher because in the coastal counties about 95 percent of all domestic waste was collected. The total amount increases yearly with about 4 percent, on one hand due to a growing level of luxury which is usual accompanied by a higher waste production. And on the other hand caused by the fact that more and more households are connected to a communal waste collection system.

Figure 1 Total amount of collected domestic waste in Croatia, in 1995, 2000 and 2004

In table 7.1 the report State of the Environment of the Croatian Republic provides data on collected domestic waste per county. We compared the total amount of each coastal county (except Lika-Senj) with the volumes of ship waste collected in that particular county. We assumed that a ton of domestic waste has a volume of 3 m³. The data of 2004 are extrapolated to the year 2007. The result is shown in the table below.

Table 1 Amounts of collected domestic waste in 2004 per coastal county compared with the volume of collected annex V waste.

County	amount of collected domestic waste in 2004	extra-polation for 2007	calculated volume in m ³ of domestic waste in 2007	Main ports	volume of annex V waste	%
Istarska	64.900	72.705	218.116	Pula	250	0,1%
Primorsko-goranska	92.200	103.289	309.866	Rijeka	1.448	0,5%
Zadarska	38.200	42.794	128.383	Zadar	730	0,6%
Šibensko-kninska	25.200	28.231	84.692	Sibenik	504	0,6%
Splitsko-dalmatinska	101.400	113.595	340.785	Split	8.022	2,4%
Dubrovačko-neretvanska	33.200	37.193	111.579	Ploče , Dubrovnik	7.275	6,5%

These calculations show that the volume of ship waste is relatively small comparing to the total amounts of domestic waste to be processed and/or disposed in most coastal counties, except Dubrovačko-neretvanska and to a lesser extent in Splitsko-dalmatinska. The county Dubrovačko-neretvanska has two major ports and a relatively low population density, so especially in this county the ship waste should be taken into account during the process of designing the Waste Management Centre. The limiting factor will not be the recycling but the final disposal (landfill) of waste which cannot be recovered. So the quality of the ship waste needs attention: the better it is segregated in recyclable fraction, the less capacity is needed for controlled landfill.

Conclusion: it should be verified whether the counties Dubrovačko-neretvanska, and to a lesser extent in Splitsko-dalmatinska included the annex V ship waste in their capacity calculations for the Waste Management Centres.