



**plastic waste recycling
and its opportunities
in bangladesh**



Background

Plastics, a marvel of polymer chemistry, have become an indispensable part of our daily life. At the same time, its disposal is being viewed as a matter of environmental concern since plastics are non-bio-degradable.

The importance of plastic sector to the national economy may be gauged from the fact that the domestic demand which was 540,000 tons in the year 2005 is growing at the rate of 5% per annum. This confirms that plastic is a material of choice and is used in all sectors of the economy, such as infrastructure, construction, agriculture, consumer goods, and telecommunication as well as in packaging. All plastic at certain stage is disposed by the user. However, there has been a dearth of information regarding composition of plastic waste and about its mode of disposal in Dhaka in particular and Bangladesh in general as well as demand-supply situation of recycled plastic granules/pellets.

This brief report is a synopsis of a detailed study initiated by Catalyst and conducted by Waste Concern Consultants. It is intended to provide first hand information on the subject to the policy makers, industrialists, SMEs and environmentalists.

Plastic Industries and Its Contribution to the Economy

According to Bangladesh Plastic Goods Manufacturer and Exporters Association (BPGMEA), there are 2997 plastic industries located in different parts of Bangladesh. Following Table shows the type of plastic industries in Bangladesh.

Table 1: Type of Plastic Industries in Bangladesh

Category	Small	Medium	Large
Numbers	1965	980	52

Out of total 2997 industries, 381 are hundred percent export-oriented. Figure 1 shows the location of plastic industries in the country.

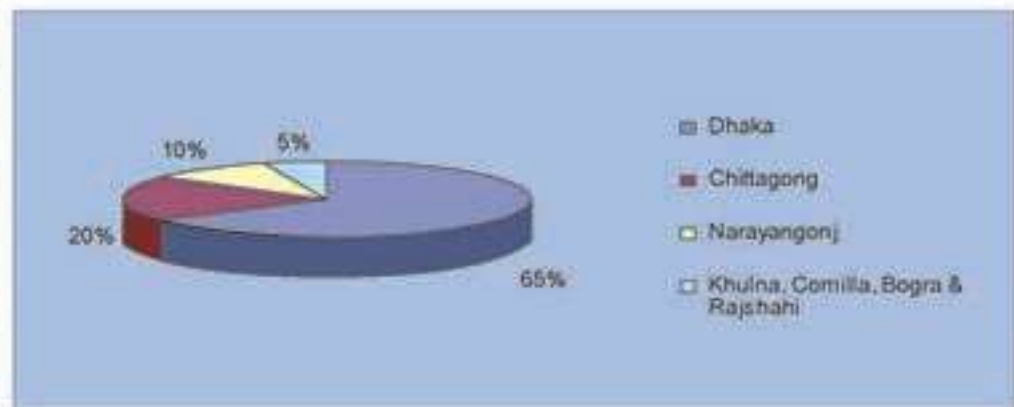


Figure 1: Location of Plastic Industries in Bangladesh

It is evident from Figure 1 that majority of plastic industries are based in Dhaka followed by Chittagong.

In terms of export of plastic items from Bangladesh, this sector has exported plastic items worth US \$ 44 million to 23 countries in North America, Europe, Asia and the Pacific and Middle East. In the SAARC region, Bangladesh is also exporting plastic goods to India, Sri Lanka and Nepal. Total foreign currency earning through export of plastic goods from Bangladesh is shown in Figure 2.

It is evident from Figure 2 that during 2002-2003 and 2003-2004 the export earning has increased by 78% while during 2003-2004 and 2004-2005 it has increased by 87%. Plastic sector has paid tax and vat worth US \$ 134 million during 2004-2005 financial year to the national exchequer. Plastic sector is now ranked 12th in terms of export oriented sectors of the country.

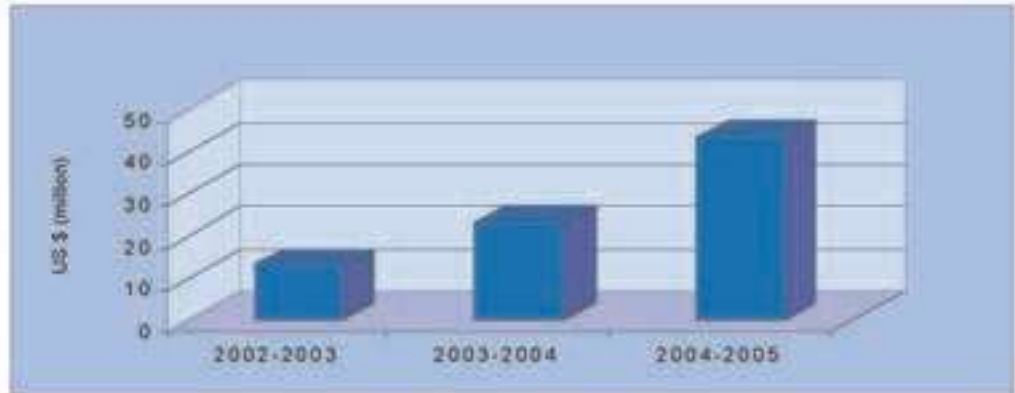


Figure 2: Export Earnings from Plastic Sector During Last Three Years

Quantum of Plastic Waste Generated in Dhaka

A survey on solid waste generation rate and physical composition analysis found that per capita solid waste generation rate in Dhaka City Corporation (DCC) area is 0.524 kg/cap/day and the total amount of solid waste generated in DCC area is estimated at 3315 tons/day. On average 4.15% of the total waste generated in DCC area is plastic. It may be mentioned here that about 40.76 tons of plastic waste is collected by Feriwallas / buyers before disposal by the households.

Average Consumption of Plastic in Dhaka City and in Bangladesh

No previous data is available regarding amount of plastic consumption in Dhaka. However, assuming that amount of plastic disposed or sold by the households is equal to the amount of plastic consumed, we can estimate the amount of plastic consumed per person in Dhaka. Based on the total sale or disposal of plastic waste by households belonging to different income group, the estimated per capita per year consumption of plastic is shown in Table 2

Table 2 Average Plastic Consumption in DCC Area

Income Group	Per Capita Plastic Consumption (Kg/cap/year)	Population (%)	Average Plastic Consumption Per Year (kg/cap/year)
Low	5.235	55	9
Middle	12.73	40	
High	14.01	5	

Source: Field Survey, September to November 2005

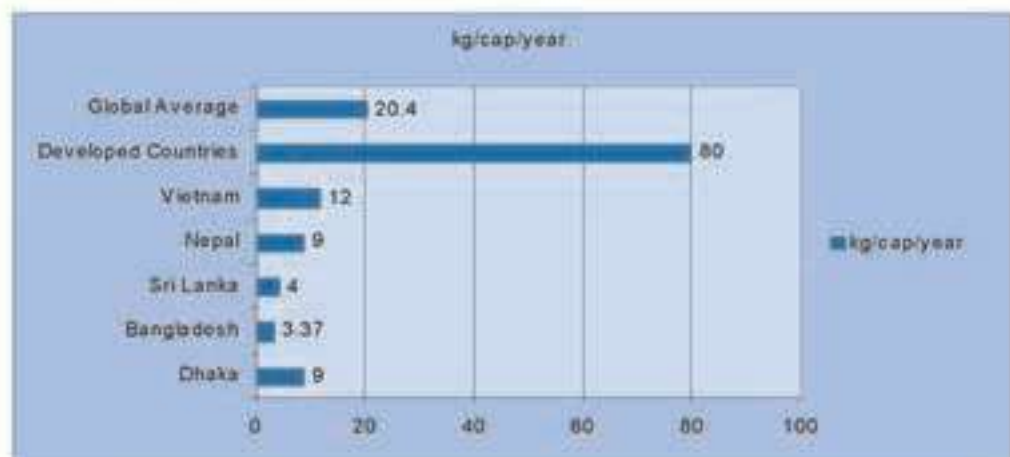


Figure 3: Comparison of Plastic Consumption of Different Countries



It is estimated that in the year 2005, 438,000 tons of plastic resin was used including recycled resin to produce plastic products against a demand of 540,000 tons. The estimated population of the country in 2005 was 130 million. As such per capita plastic consumption works out at 3.37 kg/year.

Actors involved in the waste collection and recycling process

The amount of plastic consumed in Dhaka is lower than the global average of plastic consumption which is 20.4 kg/cap/year, while the average consumption of plastic in developed countries is found to be 80 kg/cap/year.

Growth of Plastic Waste Over the Last Ten Years in Dhaka

Following figure shows the growth in percentage of plastic waste in the waste stream of DCC area over the last thirteen years.

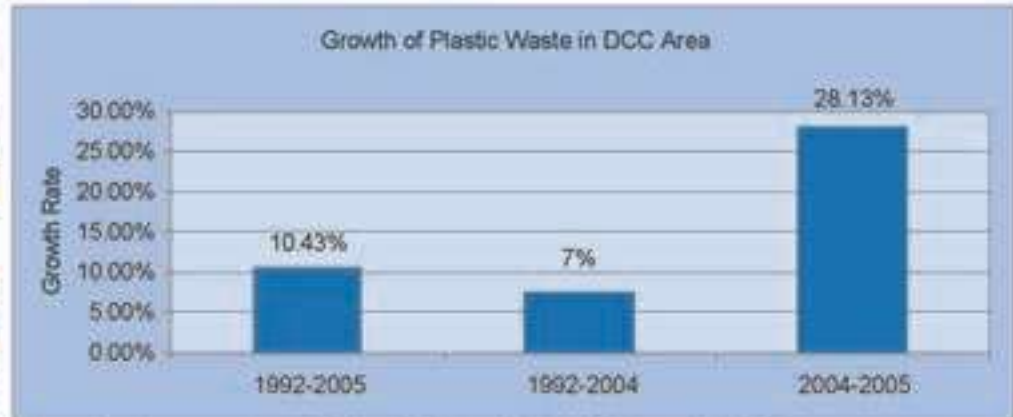


Figure 4: Average Annual Growth Rate of Plastic Waste in DCC Area

Source: Data of 1992, 2004 & 2005 are from World Bank, JICA & Waste Concern Consultants respectively

It is evident from the above graph that average annual increase in the plastic waste is 10.43% during 1992-2005 while it was around 7% during 1992-2004. Between 2004-2005, the growth in plastic waste is 28%.

Plastic Waste Recycling Chain in Dhaka

The number of actors involved in plastic waste collection and recycling is shown in Tables 3 and 4.

Table 3: Number of Jobs Created by Plastic Waste Collection Process in Dhaka

Actor	Male	Female	Total	Female (%)
Feriwalla	1660	-	1660	-
Van Collector	4558	-	4558	-
Wastebin Tokal	1446	620	2066	30%
DCC Collector	2000	-	2000	-
Dump Tokal	212	88	300	29.33%
Total	9876	708	10524	6.72%

Source: Waste Concern Consultants, 2005

Table 4: Number of Jobs Created by Plastic Waste Recycling Process in Dhaka

Actor	Male	Female	Total	Female (%)
Vangaridokan	1300	-	1300	-
Broker	2058	686	2744	25%
Wholesaler	1137	487	1624	30%
Manufacturer	5478	1122	6600	17%
Total	9973	2295	12268	18.7%

Source: Waste Concern Consultants, 2005

It is evident from the above Tables that in plastic waste recycling sector 22,792 persons are working in DCC area of which about 13% are female. As per BBS (2002), in urban



Feriwalla



Dump Tokal



Dustbin Tokal



Van Collectors



DCC Collectors



Vangari Shop



Wholesaler

Manufacturers
(Pellet Producers)Manufacturers
(Commodity Producers)Manufacturers
(Commodity Producers)

areas of Bangladesh the employed labor force is 37% of the total urban population. Total employed population in DCC area is 2.34 million of which 1.40 million are working in the informal sector. As such 1% of the employed labor force in DCC area is working in plastic waste recycling sector, which represents 1.63% of total employed labor force in informal sector.

Plastic Waste Recycling Process

Recycling can be very conveniently broken down into a number of steps. Figure 5 shows the flow diagram of a typical recycling process followed in Dhaka as well as in other parts of Bangladesh.



Figure 5: Plastic Waste Recycling Process

In Bangladesh, all sorting is done manually. This is an important aspect of the economics of recycling because sorting constitutes over one-third of the cost of recycling. Cheap and readily available labor in urban areas of Bangladesh make cost-effective manual sorting a possibility. Washing is an expensive operation, and often the volume of water required to accomplish washing simply is not available in the locations where these crude recycling factories exist. Washing is therefore predominantly practiced with PET bottles because the chips prepared from those have a ready export market.

All recycling equipments used in Bangladesh are fabricated locally. Since recycling equipment are all simple pieces of equipment, and Bangladesh recycling industry being not subject to any regulation, it is possible to fabricate them locally.

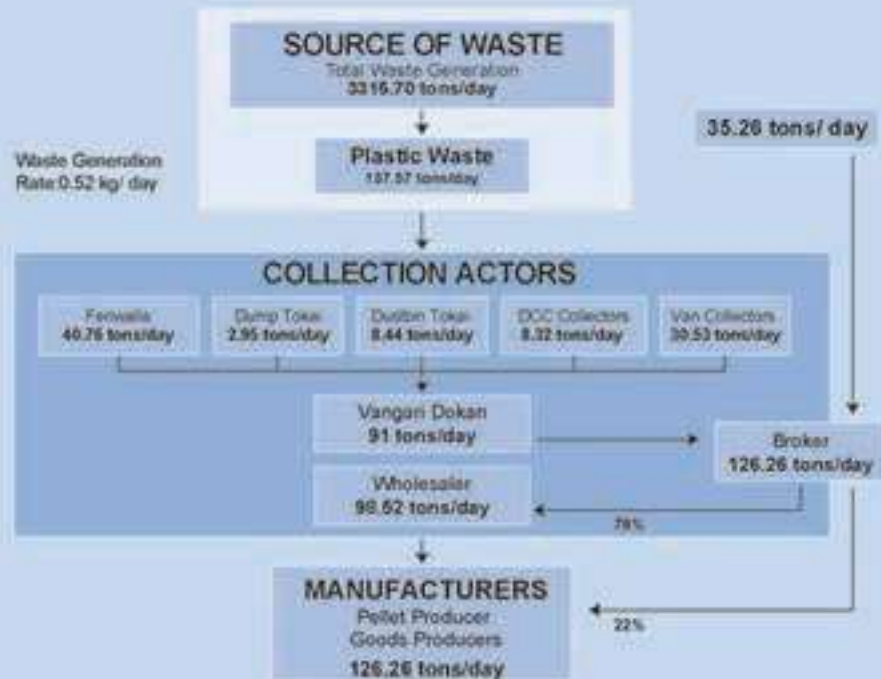


Figure 6: Plastic Waste Recycling System of DCC Area

It is evident from Figure 6 that 126.26 tons of plastic waste is recycled per day in DCC area of which 91 tons is collected within DCC area while the rest 35.26 tons/day is collected from greater Dhaka, i.e. Dhaka megacity. Out of the collected plastic waste of 91 tons/day, 45% is unsoiled which is collected by feriwallas while the rest 55% is soiled which is collected by other actors. It can also be seen from Figure 6 that pellet manufacturers mainly purchase plastic waste from the wholesalers and in some cases collect from brokers.

Type and amount of plastic waste recycled in DCC area is shown in Figure 7. It is also observed that out of the total generated plastic waste of 178.33 tons which is a combination of disposed waste as well as waste collected by feriwallas. 51% of this waste is recycled and the remaining 49% is left unutilized in waste dump sites due to being too soiled. However, considering the amount of disposed waste, the recycling rate is around 66%.



PET Bottles



HDPE



Soft PVC



Hard PVC



PP



LDPE

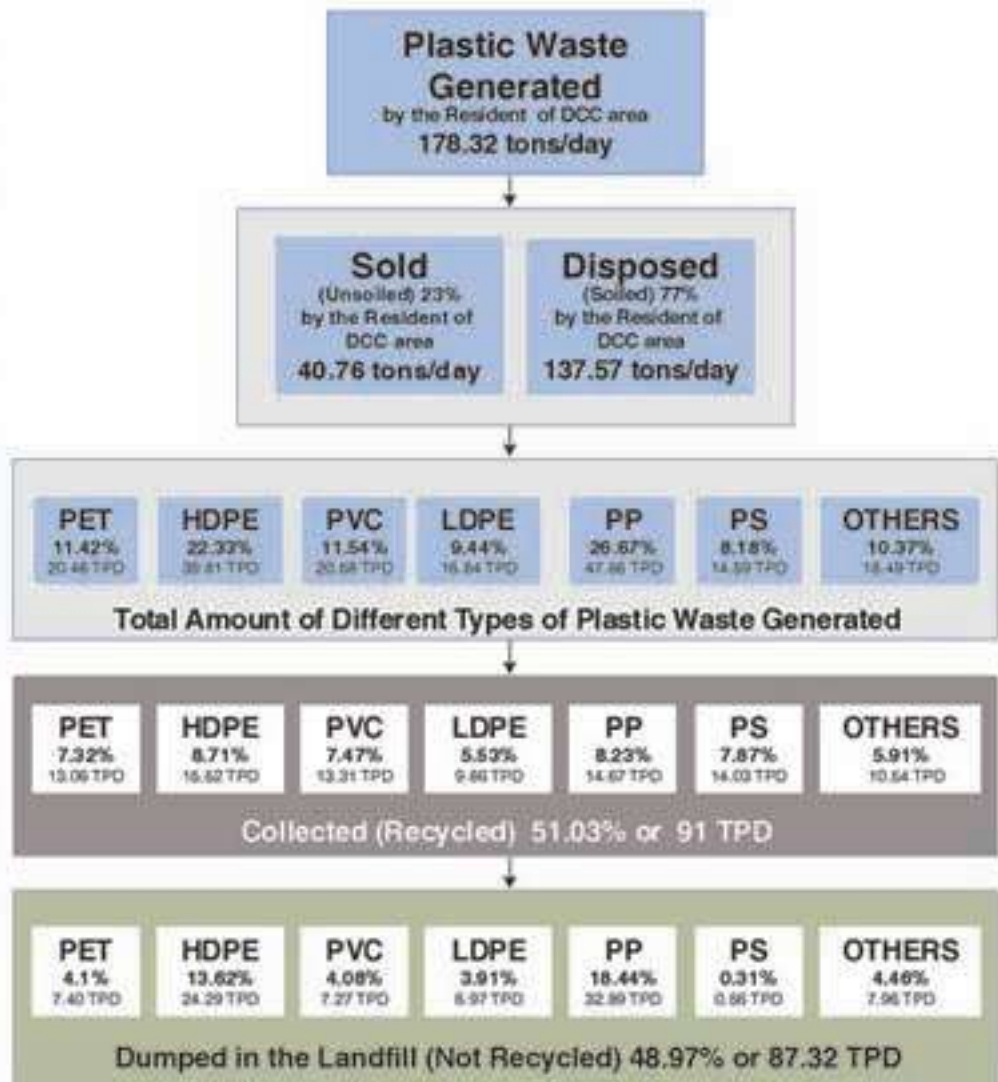


Figure 7: Type and Amount of Plastic Waste Recycled in DCC Area

Quantum of Plastic Waste Recycled in Bangladesh

In Dhaka, it has been found that 66% of plastic disposed by the households are recycled. It has been also found from the field survey that on average a plastic product manufacturing factory requires about 0.6 tons of resin per day. There are 3000 plastic goods manufacturing industries in Bangladesh and assuming 300 days of operation per year, the total demand for resin is estimated at 540,000 tons per year. However, from field survey it has been found that there is a shortfall of 18.9% between demand and supply of resin. As such, the available resin amounts to 438,000 tons per year.

How Does Plastic Waste Recycling Help Our Economy

The recycling of plastics has the following direct economic benefits for the country:

- (i) Less landfilling requirement
- (ii) Large recycling industry jobs and economic output
- (iii) Direct savings of foreign currency

It is amply clear that preventing plastics going to solid waste dumpsite and/or removing it from other solid waste results in several benefits for the nation. Firstly, plastics collected by door-to-door collectors (Feriwallas) from households and by tokais, van collectors, municipal staff from street dustbins, lessen the load of City Corporation / Municipalities waste collection job. Secondly, the land requirement for landfill is lessened by the amount of plastics waste removed. And thirdly, the removal of significant quantities of non-degradable material from the landfill greatly improves the quality of the landfill. Thus, both direct financial and environmental benefits accrue to the nation as a result of plastics recycling.



Undoubtedly, the largest economic benefit for a poor foreign currency starved country is the direct savings of foreign currency. It is axiomatic that had there been no recycling, the quantity of waste plastics that has been recycled would have to be imported because the demand for plastics products is extremely robust. This study through direct field survey has established that approximately 45% of the total plastics waste is recycled in the year 2005. Table 5 shows a snapshot view of the findings along with the savings. It is worthwhile to look at this savings in the national context. Had there been no plastic recycling approximately US\$ 350 million of resin import would have been required to sustain the demand for plastics product in the country. In the year 2005, nearly US\$ 13.14 billion was spent on imports, while the country's exports were US\$ 8.65 billion, leaving a very significant US\$ 4.5 billion deficit. With no plastics recycling, the deficit would have risen to US\$ 4.85 billion. As can be seen, the savings are a significant portion of oil import bill. To this must be added the export earnings from PET chips made from discarded PET bottles, which are not recycled in Bangladesh. Estimates of US\$ 8-10 million have been obtained from various sources. Thus, a drain of a huge amount of foreign exchange has been prevented by recycling of plastic waste.

The total demand from plastic resin in the country is 540,000 tons per year. According to BPGMEA, 295,167 tons of virgin plastic was imported in the year 2004-2005 from abroad while the rest was collected from disposed plastic waste.

Table 5 - Foreign Currency Savings Due to Plastics Recycling in Bangladesh

Item	Quantity	(%)	Value
Total resin demand in 2005	540,000 tons	100	
Virgin Resin Import	295,167 tons	55	US\$ 421 million
Quantity of Recycled Resin	244,833 tons	45	
Import Value of Recycled Resins			US\$ 350 million

Source: Field Survey



Major Findings

- Amount of plastic consumption is growing with the GDP growth of the country.
- Amount of plastic waste is also increasing with the GDP growth of the country.
- 45% of the plastic waste is recycled in the country resulting in savings of US \$350 million in the year 2005 by avoiding import of virgin resin.
- Substantial amount of plastic products worth US \$ 44 million is exported from Bangladesh in 23 countries of the world.
- Not only plastic product, plastic wastes such as used PET bottles are exported from Bangladesh worth US \$ 8 to 10 million.
- Since plastic is non-biodegradable it is essential to promote recycling of plastic waste and to reach 100% recycling rate leaving no amount of plastic waste to be landfilled.
- Price of plastic waste depends upon whether it is soiled or unsoiled, the more it becomes soiled, its sale value falls sharply rendering it difficult to recycle.
- In the plastic waste recycling industry health, safety and environmental issues are not properly looked after. This needs an urgent attention.
- Bangladesh does not have a polymer industry. Despite having a lot of natural gas, it is deficient in the raw materials for polymer production. All virgin polymers are imported. Therefore, there is a huge incentive to recycle waste plastics. This is the environmentally sustainable path in the long run.

What Needs To Be Done To Improve Plastic Waste Recycling?

Stoppage of use of plastic materials would be extremely difficult and may have negative impact on the economy. However, the management of plastic waste through proper recycling based on 4 R principle (reduce, reuse, recycle, recover) of waste with due care to health, safety and environmental issues should be encouraged. Since alternative of plastic materials would not be cost effective, hence in the near future growth of plastic materials as well as plastic waste would grow simultaneously with the growth of economy of the country.

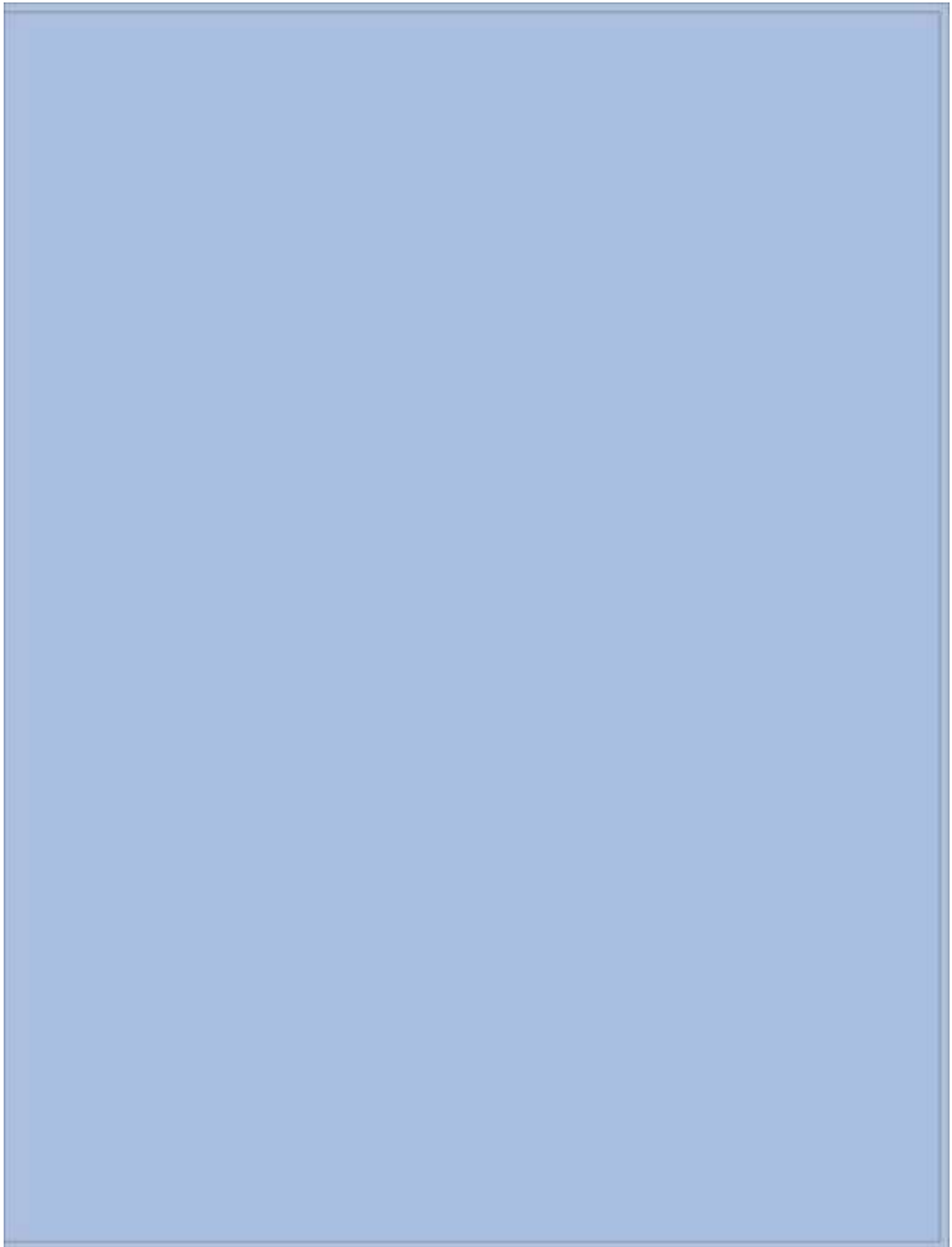


In such a scenario the best and sustainable approach is to encourage recycling of plastic waste from baseline scenario of 60% to 100%. For this following measures would be necessary:

- Promotion of Environmental Management System (EMS) in the Plastic Industry
- Awareness Campaign for Source Separation of Plastic Waste from Other Municipal Waste
- Promotion of 4R (reduce, reuse, recycle, recover) by the Government

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