



# Waste Generation



Vietnam's waste amounts to over 15 million tons each year, with municipal waste from households, restaurants, markets and businesses sources accounting for over 80 percent. Industries account for much of the remainder. Hazardous waste from industries and hazardous healthcare waste from hospitals, while produced in much smaller quantities, are important because they pose high health and environmental risks if not properly disposed (Table 1).

### Municipal Waste

Cities in Vietnam are major generators of municipal waste. Urban areas contain only 24 percent of the country's population but produce over 6 million tons of waste each year, or 50 percent of the country's municipal waste. It is estimated that an average urban dweller in Vietnam produces over two-thirds of a kilogram of waste each day, about twice the amount produced by people in rural areas (Table 2).

*Urban and rural households and businesses produce different types of waste.* Municipal waste from households, markets, and businesses in rural areas contains a large proportion (60-75 percent) of easily degradable organic waste. In urban areas, where such waste is produced in lower quantities (approximately 50 percent of municipal solid waste), the change in consumption patterns and products is accompanied by a larger proportion of hazardous waste and non-degradable waste, such as plastic, metals, and glass (Table 3).

### Industrial Waste

Industrial waste is estimated at about 20 to 25 percent of total municipal waste, depending on the size and industrial structure of a city or province.<sup>1</sup>

<sup>1</sup> Le Minh Duc and Nguyen Thi Kim Thai, 2004 consultant reports submitted to WB

**Table 1. Waste Generation in Vietnam in 2003**

	Sources	Types	Waste Generation (tons/yr)		
			Urban	Rural	Total
Municipal Waste	Residential Commercial Markets	Kitchen waste plastic paper glass	6,400,000	6,400,000	12,800,000
Industrial Non-Hazardous Waste	Industries	metals wood	1,740,000	770,000	2,510,000
Industrial Hazardous Waste	Industries	fuel oil waste sludge organic chemicals	126,000	2,400	128,400
Hazardous healthcare Waste	Hospitals	tissue samples blood syringes	-	-	21,500
<b>Total-non agricultural waste</b>			<b>8,266,000</b>	<b>7,172,400</b>	<b>15,459,900</b>
Agricultural	Cultivation Livestock	Plant matter	NA	64,560,000	64,560,000

*Note: Industrial waste excludes mining waste, Rural industrial waste derives from craft villages,*

*Source: Consultant Data Group survey 2004, SOE report 2002, MOH 2004, NEA 1999, MOI 2002-2003*

**Table 2. Municipal Solid Waste Generation**

	Generation Rate (kg/person/day)	Waste Gen (% of total)	% organic
<b>Urban Areas (national)</b>	<b>0.7</b>	<b>50</b>	<b>55</b>
Ho Chi Minh City	1.3	9	
Ha Noi	1.0	6	
Da Nang	0.9	2	
<b>Rural Areas (national)</b>	<b>0.3</b>	<b>50</b>	<b>60-65</b>

*Source: Urban data by Consulting Data Group survey 2004; Rural data calculated using studies by NEA (2000) and Agriculture University No.1 (2003)*

**Table 3. Waste Composition in Hanoi**

Waste component	Percent of total	
	1995	2003
Organic	51.9	49.1
Paper and textiles	4.2	1.9
Plastic, rubber, leather, wood, hair, feathers	4.3	16.5 (Plastics 15.6)
Metal	0.9	6.0
Glass	0.5	7.2
Inert matter	38.0	18.4
Others	0.2	0.9

*Source: 1995 data from M. Digregorio 1997. East-West Center, Hawaii; 2003 data from CETIA monitoring data, 2003*

# WASTE GENERATION

SOLID WASTE

**Industrial waste is concentrated in the South.** Nearly half of the industrial waste in the country (Figure 1) is produced in the Northeast Mekong Delta region. The main city in this region, Ho Chi Minh City, accounts for 31 percent of the total industrial waste generated in Vietnam. The Mekong Delta region is followed by the Red River Delta and North Coast regions.

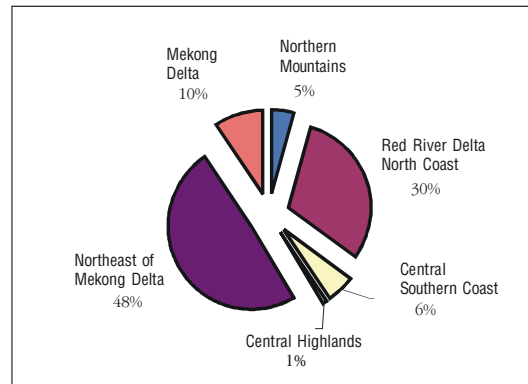
**Rural industrial waste from craft villages is concentrated in the North.** Craft villages are a distinctive feature of Vietnam. They are rural villages where most of the village's income comes from specialization in a particular craft, such as pottery making, textile and garment production, waste recycling, food processing, or other handicraft production. There are 1,450 craft villages distributed across 56 provinces in the rural areas of Vietnam, and they generate about 774,000 tons of non-hazardous industrial solid waste per year. Fifty-four percent of this waste comes from the three northern provinces of Ha Tay, Bac Ninh, and Ha Noi, and 68 percent of all waste comes from the North (Figure 2).

## Hazardous waste

Total hazardous waste generation in 2003 was about 160,000 tons per year. The vast majority, 130,000 tons/yr, was from industry. Hazardous healthcare waste from hospitals, clinics, and sanitariums accounted for about 21,000 tons/yr, while agricultural sources accounted for 8,600 tons/yr.<sup>2</sup>

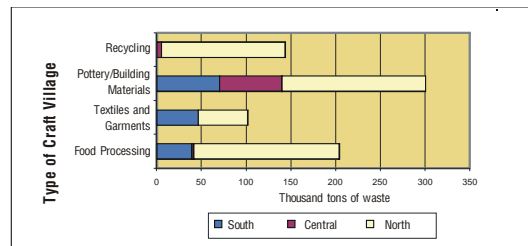
**The South produces the majority of industrial hazardous waste.** About two-thirds (64 percent) of the hazardous waste is generated in southern Vietnam, with Ho Chi Minh City accounting for half of this. The next highest source is the North (31 percent). The largest

Figure 1. Industrial Waste Generation



Source: MOI, Survey 2000-2003

Figure 2. Waste in Craft Villages by Region



Notes: Excludes 23,000 tons of waste generated a year by a variety of other types of craft villages.

Source: INEST, 2003.

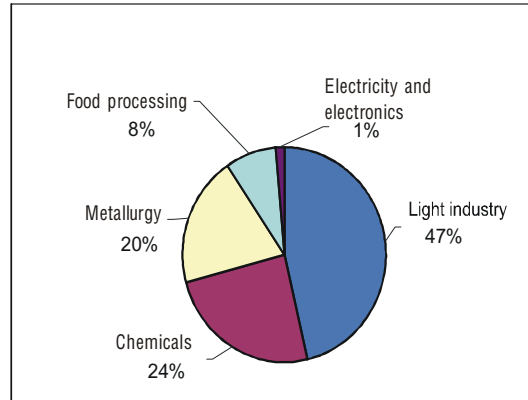
<sup>2</sup>Based on VEPA 2004 preliminary survey results and compiled from various sources by VEM team.

producers of industrial hazardous waste are light industry (47 percent), followed by chemicals (24 percent), and metallurgical industries (20 percent) (Figure 3).<sup>3</sup>

*Every province produces a significant quantity of hazardous healthcare waste.* Approximately 20 percent of the general healthcare waste is hazardous. While the metropolitan areas of Ho Chi Minh City and Hanoi account for 23 percent of the hospital capacity in the country, the hospital system is well established throughout the country, with each of the provinces having a minimum capacity of 500 beds. The areas around Ho Chi Minh City, Thanh Hoa Province, and Hanoi City<sup>4</sup> generate about 6,000 tons of hazardous healthcare waste each year. Other provinces generate smaller amounts, from 0.2 to 1.5 tons daily.

*Agricultural operations produce large amounts of toxic pesticide residues and pesticide containers each year.* The 8,600 tons of hazardous waste from agriculture is predominantly comprised of pesticides and pesticide containers, much of which is banned and illegally imported. The largest concentration of pesticide use is in the Mekong River Delta. In addition, there are 37,000 tons of confiscated agricultural chemicals that have been stockpiled and need urgent treatment.

Figure 3. Sources of Industrial Hazardous Waste

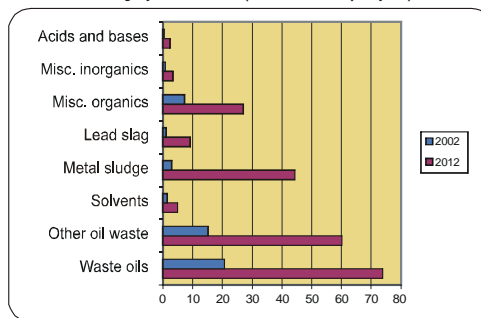


Source: VEPA, 2004, ongoing survey.

#### Box 1. Industrial hazardous waste in the Southern Focus Economic Zone

The Southern Focus Economic Zone, which comprises Ho Chi Minh City, Dong Nai, Binh Duong, and Ba Ria-Vung Tau, generates most of the industrial hazardous waste in the country. The volume was estimated to be 73,275 tons in 2002 and could quadruple to 308,775 tons by 2012. The major types of hazardous waste found in the SFEZ were waste oils, primarily from the transportation manufacturing and maintenance sector (87 percent), and other oily waste from a variety of sectors, including the oil and gas sector (22 percent), and the footwear (58 percent), textile (12 percent) and leather (13 percent) industries.

Estimated hazardous waste generation by waste category in the SFEZ (thousand tons per year)



Source: NORAD, 2003, Masterplan for hazardous waste management in HCMC, Dong Nai, Binh Duong and Ba Ria - Vung Tau (excludes packaging and container waste)

<sup>3</sup> VEPA 2004, on-going survey.

<sup>4</sup> The three most populated provinces and cities in Vietnam and therefore have the largest number of hospital beds

# WASTE GENERATION

SOLID WASTE

## The Future of Waste in Vietnam (see Methodology section for details)

Vietnam is in the midst of a rapid economic expansion, modernization, and urbanization. With this growth, it is anticipated that waste generation will increase to over 23 million tons by 2010, and the types of waste produced will undergo a change from more degradable to less degradable and more hazardous.

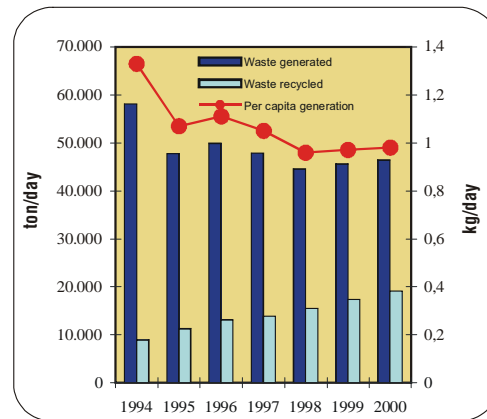
	Trends in Vietnam (see methodology section for details)	Effects on Waste Generation	Waste Projections (see methodology section for details)
<b>Increasing consumption</b>	<p><b>Rapid growth</b> Incomes have more than doubled in the last 10 years and have grown an average of 5 percent annually between 2000 and 2002. Consumption grew 8 percent in 2002 and increased an average of 5 percent annually from 1992 to 2002.</p>	<p>Increased municipal waste generation due to increased consumption and increasing proportion of packaging waste.</p> <p>Increase in amount of plastics and toxics due to more modern products.</p>	<p><b>Municipal Waste</b></p> <p>2004: 12 million tons (50 percent urban)</p> <p>2010: 20 million tons (63 percent urban)</p>
<b>Population growth</b>	<p><b>Moderate Growth</b> Population growth rate is currently a modest 1.3 percent annually, which should result in an increase from the current population of 82 million (2004) to 89 million by 2010.</p>	<p>Population growth is expected to contribute to municipal waste generation, but to a lesser degree than the growth in income and consumerism.</p>	
<b>Urbanization</b>	<p><b>Rapid Growth</b> Urbanization in Vietnam is rapid and is expected to increase from the current level of 24 percent to 33 percent in 2010, resulting in 10 million more people in urban areas.</p>	<p>The growth in urban areas is expected to be the main driver for increases in municipal waste generation. Waste is expected to increase from non-household sources such as shops, restaurants, hotels and offices, and as a result of improved incomes and purchasing power.</p>	<p><b>Industrial Waste</b></p> <p>2004: 2.2 million tons (6 percent hazardous - 130,000 tons). 2010: 3.2 million tons (15 percent hazardous - 500,000 tons).</p>
<b>Industrialization</b>	<p><b>Rapid Growth</b> Industrial growth has averaged 7 percent since 2000 and is the main driver for growth, accounting for 38 percent of Vietnam's GDP growth in 2002. Non-state owned industries have grown faster than those that are SOEs owned, yet the state sector still dominates industrial output.</p>	<p>Industrial waste production is expected to increase rapidly in a strong economy. The cleaner, more efficient processes anticipated in the growing non-state sector would be expected to temper the growth in total amount of waste produced. However, growth in hazardous-waste-intensive industries such as chemical products and electronic products is expected to increase the proportion of hazardous waste generated.</p>	
<b>Modernization of healthcare</b>	<p><b>Moderate Growth</b> Growth in the number of beds in hospitals has been moderate (1.4 percent annually), while the number of beds in regional polyclinics, clinics, and sanitariums has decreased.</p> <p>Investment in modernization of equipment has been significant. Between 1997 and 2001, \$150 million was spent on new medical equipment and \$29 million on upgrading equipment.</p>	<p>While the number of patients is not expected to increase as rapidly as in the past, hazardous healthcare waste will increase more rapidly as a result of the adoption of new medical techniques, use of more disposable medical equipment such as plastic syringes, and an increase in tests, therapies, and operations undertaken for each patient.</p>	<p><b>Hazardous Healthcare Waste</b></p> <p>2004: 21 thousand tons; 2010: 25 thousand tons</p>

*Acting now to reduce waste generation could save on future disposal needs.* Given the anticipated rapid growth in waste in Vietnam, programs to encourage lower waste generation in households, businesses, industries, and hospitals could significantly reduce the waste-disposal burden in the future. By promoting awareness and providing economic and other incentives, experience from other countries has shown that the amount of waste can be reduced significantly (Box 2). For example, a 10-percent reduction in waste generation would result in an annual savings on disposal of approximately VND 200 billion for municipal waste and VND 130 billion for hazardous healthcare waste.

Cleaner industrial production is another way to reduce the cost of waste disposal. Since being introduced in Vietnam 10 years ago, the Cleaner Production (CP) approach to waste reduction in industries has demonstrated its ability to produce both economic and environmental benefits (Box 3)

### Box 2. Using Economic Incentives to Reduce Waste

South Korea introduced a volume-based fee system in 1995, in which charges for waste management services are based on the volume of waste generated per household. The initiative is based on the "polluter pays" principle, and promotes a reduction of waste generation at the source. The system has played a significant role in reducing the volumes of waste generated by promoting recycling, while it has also helped to cut municipal waste management costs.



Source: Ministry of Environment, Republic of Korea

### Box 3. Demonstrating Cleaner Production in Vietnamese Industries

The Vietnam National Center for Cleaner Production is leading the way in promoting CP, by conducting assessments of more than 50 companies throughout the country between 1998 and 2003 (see table below).

#### Benefits from Cleaner Production in Vietnamese Industries

Production Characteristics	Type of Industry	
	Wool Manufacturing Company	Paper Recycling Company
Annual production output	Over 500,000 sweaters, 300,000 socks, 85 tons dyed wool	1,500 tons of paper
Cleaner Production actions taken <sup>1</sup>	Recycle cooling water and condensate for heat savings	Replace boiler fan and recycle condensate; recover paper fiber from wastewater
Annual coal savings	140 tons (26%) <sup>2</sup>	124 tons (16%) <sup>2</sup>
Annual coal ash reduction	42 tons	37 tons (31%) <sup>3</sup>
Annual net financial gain	94 million VND	90 million VND

Notes: (1) Negligible investment required for these measures, therefore payback period was immediate. (2) Percentage of the amount of original production input. (3) Percentage of the amount of original waste output.

Source: INEST, 2003