

MINIMIZATION OF HAZARDOUS WASTE IN WESTERN EUROPE:
POLICY IMPLEMENTATION AND HARMONIZATION

by

MARINA ALBERTI

Dottore, Urban Planning, University of Venice
School of Architecture
(1981)

SUBMITTED TO THE DEPARTMENT OF
URBAN STUDIES AND PLANNING
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY IN URBAN AND REGIONAL PLANNING

at the

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
June, 1992

© Marina Alberti, 1992. All rights reserved

The author hereby grants to MIT permission to reproduce and to
distribute copies of this thesis document in whole or in part.

Signature of Author. .
Department of Urban Studies and Planning
June, 1992

Certified by
Lawrence Susskind
Professor, Urban and Environmental Planning
Dissertation Supervisor

Accepted by .
Bernard Frieden ✓
Professor, Urban Studies and Planning
Chair, Ph.D. Committee

9075
MASSACHUSETTS INSTITUTE
OF TECHNOLOGY

NOV 23 1992

LIBRARIES

MINIMIZATION OF HAZARDOUS WASTE IN WESTERN EUROPE:
POLICY IMPLEMENTATION AND HARMONIZATION

by

MARINA ALBERTI

Submitted to the Department of Urban Studies and Planning
in Partial Fulfillment of the Requirements for the Degree
of Doctor of Philosophy in Urban and Regional Planning

Abstract

This dissertation examines why European policies aimed at minimizing hazardous waste have failed to accomplish their goal. Four national case studies show the obstacles to implementing hazardous waste minimization in Germany, Italy, the Netherlands and the UK. A conflict assessment approach is employed to identify the interests, conflicts and trade-offs involved in hazardous waste minimization efforts and the interactions between national and cross-national dimensions of hazardous waste issues, which affect their implementation.

Increasing production of hazardous waste in Germany, Italy, the Netherlands and the UK shows that all of these countries have failed to achieve minimization of hazardous waste, despite striking differences in how each country has pursued this goal. In all four countries national policies failed because of conflicts among interest groups. At the center of these conflicts are three trade-offs: (1) between environmental protection and economic development; (2) between risks and costs; and (3) in the distribution of costs among different groups, geographic regions and generations.

Parties that have a major interest in decisions about minimizing hazardous waste are typically excluded from the policy making process. Thus, disagreements on the choices to be made emerge during implementation and impede the achievement of policy objectives. The recent success of a new preventive policy adopted in the Netherlands through the committed involvement of all interest groups in setting minimization targets shows that an open policy process can improve implementation.

The growing interdependence among nations has been shown to be relevant to the effective implementation of many national policies. Discrepancies among regulatory systems in Europe run counter to national efforts to minimize hazardous waste. The creation of a single market will exacerbate the problem and lead to new conflicts. Increases in waste production and trans-frontier movement of hazardous waste are expected to follow accelerated economic growth and the removal of barriers. Increased tension is likely to emerge among interest groups and among countries willing to adopt different waste minimization strategies. The harmonization of European policies provides an opportunity for resolving regional and international conflicts.

Dissertation Supervisor: Dr. Lawrence E. Susskind
Professor of Urban and Environmental Planning

ACKNOWLEDGEMENTS

I would like to record my deep gratitude to my adviser Larry Susskind, and my co-advisers Patricia Hynes, Michael Wheeler and Bill Clark. My thanks also to: Louise Dunlap, Massachusetts Institute of Technology; Julie Garman, European University, Brussels, Belgium; John Ehrenfeld, Massachusetts Institute of Technology; Giandomenico Majone, European University Institute, Italy; Jonathan Parker, University of Cambridge, UK; and Brian Wynne, University of Lancaster, UK. I would like to thank particularly my family and friends who have been incredibly supportive and have encouraged me during all the difficult steps of this project. Thanks also to all MIT staff and particularly to the staff at the Computer Resources Laboratory. I want to thank also Helen Snively who has helped me with editing the dissertation. Many other people helped me with this research but there is not space to thank them all here. None of these people have responsibility for the faults or limitation of this project.

A mia madre e mio padre

EXECUTIVE SUMMARY

The minimization of hazardous by-products of human activities is one of the priorities of public policies in all developed nations. Western European policies have placed increased emphasis on the minimization of hazardous waste and have indicated that waste prevention is the preferred option for managing hazardous residuals. However, the increasing production of hazardous waste in Western European countries shows that these policies have not succeeded in meeting their goals.

Similar implementation patterns of hazardous waste minimization policies emerge in Germany, Italy, the Netherlands and the UK. These countries have failed to achieve minimization of hazardous waste, despite striking differences in how each country has pursued this goal. Tighter standards and increased waste disposal costs, coupled with loopholes in regulations, have resulted in increased export of hazardous waste to less regulated countries, thus thwarting national efforts at minimization.

National policies aimed at minimizing hazardous waste fail because of conflicts among interest groups which are excluded from the policy-making process. At the center of these conflicts are three trade-offs: (1) between environmental protection and economic development; (2) between risks and costs; and (3) in the distribution of costs among different groups, geographic regions and generations.

Different implementation patterns emerge depending on how public agencies deal with these conflicts. The success of the recent Dutch policy in setting minimization targets for priority waste streams is explained by the committed participation of social, economic and political actors in drafting these measures and on the ability of the Dutch public agencies to resolve these conflicts.

The growing interdependence among nations has been shown to be relevant to the effective implementation of many national policies. One of the major challenges

facing the implementers of hazardous waste policy is the highly integrated worldwide market in chemical production and waste management. In Europe, the creation of a single market will exacerbate this interdependence and lead to new conflicts. Increases in waste production and trans-frontier movement of hazardous waste are expected to follow the accelerated growth and the removal of barriers. Increased tension is likely to emerge amongst countries willing to adopt different waste minimization strategies.

The harmonization of European policies is seen to be crucial for achieving the minimization of hazardous waste. Three key factors affect the chances of policy harmonization to succeed. The first is the extent to which environmental considerations will drive the process of market integration. The second is the influence of distributional considerations in the allocation of costs and benefits. The third is the extent to which countries are willing to forego their national prerogatives in favor of cross-national priorities.

Disagreement among countries regarding the choices to be made have thus far limited progress in harmonizing hazardous waste regulation. The varying attitudes of European countries toward policy harmonization reflect the trade-offs made by interest groups at the national level and by member states at the European level, particularly when balancing national and cross-national priorities. Resistance from national governments to establishing a common regulatory framework also stems from the differences across the different national regulatory styles and institutional arrangements.

Policy harmonization provides the opportunity for resolving regional and international conflicts. The involvement of non-governmental interests and the institutionalization of consensus building processes could accomplish this goal.

CONTENTS

ABSTRACT	i
ACKNOWLEDGEMENTS	ii
EXECUTIVE SUMMARY	iv
CONTENTS	vi
LISTS OF ILLUSTRATIONS	x
ACRONYMS	xiv
INTRODUCTION	1
CHAPTER 1 HAZARDOUS WASTE MANAGEMENT	
A CROSS-NATIONAL PERSPECTIVE	5
1.1 The EC policy for waste management	9
<i>Evolution of the EC environmental policies</i>	
<i>The minimization of hazardous waste</i>	
<i>The implementation gap</i>	
<i>The information gap</i>	
<i>The EC policy response</i>	
<i>The need for an open policy process</i>	
1.2 National Policies and Regulatory Systems	38
<i>Germany</i>	
<i>Italy</i>	
<i>The Netherlands</i>	
<i>United Kingdom</i>	
1.3 Comparative analysis of management approaches	68
<i>Formal vs. informal approaches to regulation</i>	
<i>Centralized vs. decentralized systems</i>	
<i>Public monopoly vs. market</i>	
<i>Public information and participation</i>	
<i>Scientific controversy</i>	
CHAPTER 2 OBSTACLES TO IMPLEMENTATION:	
FOUR CASE STUDIES OF WASTE MINIMIZATION	77
2.1 Patterns of hazardous waste minimization in four	
European countries	79
<i>National case studies</i>	
<i>Obstacles to implementation</i>	
<i>Four patterns of implementation</i>	

2.2	The German uniform technical standard system	88
	<i>Policy and regulations</i>	
	<i>Implementation</i>	
	<i>Obstacles</i>	
	Illustrations:	
	1) <i>From incineration to minimization of chlorinated hydrocar</i>	
	2) <i>Labeling PVC containers</i>	
2.3	The Italian regional planning system	99
	<i>Policy and regulations</i>	
	<i>Implementation</i>	
	<i>Obstacles</i>	
	Illustrations:	
	(3) <i>Waste minimization through emergence planning</i>	
	(4) <i>The tax on plastic bags</i>	
2.4	The Dutch policy on priority waste streams	105
	<i>Policy and regulations</i>	
	<i>Implementation</i>	
	<i>Obstacles</i>	
	Illustrations:	
	(5) <i>Waste Plastics</i>	
	(6) <i>The KSW 2000 project</i>	
2.5	The UK discretionary and decentralized system	115
	<i>Policy and regulations</i>	
	<i>Implementation</i>	
	<i>Obstacles</i>	
	Illustrations:	
	(7) <i>Waste minimization at local level: the West Midlands Co</i>	
	(8) <i>The ICI case</i>	
2.6	Cross-country analysis	119
CHAPTER 3 HAZARDOUS WASTE POLICY MAKING		
	A CONFLICT ASSESSMENT APPROACH	122
3.1	Hazardous waste issues	124
	<i>Definitions of hazardous waste</i>	
	<i>Environmental impacts</i>	
	<i>Control options</i>	
	<i>The utopia of total control</i>	

3.2	Actors and interests	144
	<i>Industry</i>	
	<i>National governments</i>	
	<i>Local governments</i>	
	<i>Citizens</i>	
	<i>Environmental Organizations</i>	—
3.3	Conflicts and tradeoffs	155
	<i>Environment vs. development</i>	
	<i>Risks vs. costs</i>	
	<i>Distribution of costs</i>	
3.4	Policy Options	158
	<i>No changes in regulation, but increased economic incentives</i>	
	<i>Tightening emissions- and effect-oriented regulations</i>	
	<i>Prohibiting the export of hazardous waste</i>	
	<i>Setting waste minimization targets for specified waste streams</i>	
	<i>Banning the use of hazardous chemicals from production processes</i>	
3.5	Summary	174
	CHAPTER 4 HARMONIZATION OF EUROPEAN HAZARDOUS WASTE POLICIES	176
4.1	Policy implementation and harmonization	178
	<i>A model of policy harmonization</i>	
	<i>Actors and interests</i>	
	<i>Conflicts and tradeoffs</i>	
4.2	Harmonization of hazardous waste policies	196
	<i>The impact of the single market</i>	
	<i>Policy options</i>	
	<i>Implications</i>	
4.3	Strategies of policy harmonization	212

CHAPTER 5 THE EUROPEAN POLICY-MAKERS' VIEW OF POLICY IMPLEMENTATION AND HARMONIZATION	217
5.1 The issue	218
5.2 Policy implementation and harmonization	221
5.3 Obstacles to harmonization	222
5.4 Solutions	225
5.5 Remarks	226
CONCLUSIONS.....	250
BIBLIOGRAPHY	261
APPENDIX A	276

LIST OF ILLUSTRATIONS

FIGURES

Chapter 1

- Figure 1.1 Industrial Waste Production
- Figure 1.2 Hazardous Waste Production and Composition
- Figure 1.3 Hazardous Waste Production in Selected Countries
- Figure 1.4 Hazardous Waste Management in Selected Countries
- Figure 1.5 Hazardous Waste Trade
- Figure 1.6 Waste Life Cycle
- Figure 1.7 EC Policy Making: Comparison of Approaches
- Figure 1.8 Hazardous Waste Management (Germany)
- Figure 1.9 Hazardous Waste Management (The Netherlands)
- Figure 1.10 Waste Production and Destination (The Netherlands)
- Figure 1.11 Construction and Demolition Waste
- Figure 1.12 Synthetic Waste
- Figure 1.13 Packaging Materials
- Figure 1.14 Hazardous Waste Management (United Kingdom)
- Figure 1.15 Hazardous Waste Import (United Kingdom)

Chapter 2

- Figure 2.1 Cost of Residue Incineration with HCI Recovery
- Figure 2.2 NEPP Objectives and Expected Developments
- Figure 2.3 Plastic Waste Targets

Chapter 3

- Figure 3.1 Emissions by Waste Incinerating Plants in the Netherlands
- Figure 3.2 Estimated Number of Clean-up Sites in the Netherlands
- Figure 3.3 Perceptions of Environmental Protection versus Economic Growth
- Figure 3.4 German Tax on Special Waste
- Figure 3.5 List of ACP Countries

Chapter 4

- Figure 4.1 Factors Influencing Harmonization
- Figure 4.2 EC Environmental Law Infringements
- Figure 4.3 Comparison of the Importance of Environmental Protection within the EC

- Figure 4.4 Potential Gains from the Completion of the European Internal Market: Micro-economic Estimates

Figure 4.5 Medium-term Macro-economic Consequences of Market Integration

Chapter 5

- Figure 5.1 Economic Growth Resulting from the Single Market Exacerbating Hazardous Waste Problems
- Figure 5.2 Most Likely Effects
- Figure 5.2a Increased Production of Waste
- Figure 5.2b Increase Import/Export of Waste
- Figure 5.2c Increase cost of Waste Management
- Figure 5.2d Saturate Existing Waste Facilities
- Figure 5.2e Inhibit EC Policy for Waste Prevention
- Figure 5.3 Effects by Countries
- Figure 5.4a Impact of the Single Market on National Hazardous Waste Policies: Waste Prevention
- Figure 5.4b Impact of the Single Market on National Hazardous Waste Policies: Waste Recycling
- Figure 5.4c Impact of the Single Market on National Hazardous Waste Policies: Safe Treatment and Disposal
- Figure 5.4d Impact of the Single market on National Hazardous Waste Policies: Control over Export/Import
- Figure 5.5 Harmonization of National Regulations Reduce the Effects of Market Integration on Hazardous Waste Management
- Figure 5.6 Most Appropriate Approach to Achieve Policy Harmonization
- Figure 5.7 Obstacles to Policy Harmonization
- Figure 5.8 Obstacles to Harmonization by Countries
- Figure 5.7a Obstacles to Policy Harmonization: Interference with State Sovereignty
- Figure 5.7b Obstacles to Policy Harmonization: Different Styles of Regulation
- Figure 5.7c Obstacles to Policy Harmonization: Diversity of Institutional Settings
- Figure 5.7d Obstacles to Policy Harmonization: Resistance of Bureaucratic Structures
- Figure 5.7e Obstacles to Policy Harmonization: Conflicts of Interests
- Figure 5.7f Obstacles to Policy Harmonization: Scientific and Technical Controversies

TABLES

Chapter 1

Table 1.1	Scope of EC Environmental Action Programs -
Table 1.2	Focus of EC Environmental Action Programs
Table 1.3	Strategic Chart for a Community Management Policy on Hazardous and Other Wastes
Table 1.4	EC Directives on Waste Management
Table 1.5	List of Toxic and Dangerous Substances and Materials (Directive 78/319/EEC)
Table 1.6	Hazardous Waste Regulations in EC Countries
Table 1.7	Waste Management Hierarchy
Table 1.8	Approaches to Waste Minimization
Table 1.9	Complaints and Infringements Detected by the Commission for the Environment
Table 1.10	Italian Regional Waste Management Plans: Status of approval
Table 1.11	Estimated Annual Generation Rate for Different Categories of Solid Waste (Italy)
Table 1.12	Numbers and Capacities of Incineration Plants Operating in Italy in Different Years
Table 1.13	Principal Waste Streams in the UK
Table 1.14	National Control Systems (I)
Table 1.15	National Control Systems (II)

Chapter 2

Table 2.1	Three-Tier Management Scheme for Chlorinated Hydrocarbons (Germany)
Table 2.2	Priority Waste Streams (The Netherlands)

Chapter 3

Table 3.1	Reasons Why Materials are Intended for Disposal
Table 3.2	Disposal Operations Which May or May Not Lead to Resource Recovery
Table 3.3	Characteristics of Waste
Table 3.4	Constituents of Wastes
Table 3.5	Types of Wastes
Table 3.6	Activities Generating Wastes
Table 3.7	Contaminated Sites
Table 3.8	Control Options

Chapter 4

- Table 4.1 Comparison of Public Opinion on the Priority of
Economic Development vs. Environmental Protection
- Table 4.2 Estimated Investment Required in Southern Member States to
Raise Environmental Standards to Community Norms
- Table 4.3 Sectoral Impacts of the Single Market
- Table 4.4 Selected Environmental Effects of Selected
Industrial Sectors
- Table 4.5 Policy Harmonization Options

Chapter 5

- Table 5.1 Summary of Survey Response: Impacts of the EC Single Market
- Table 5.2 Summary of Survey Response: Policy Harmonization

ACRONYMS

CEC	Commission of the European Communities
EEC	European Economic Community
ECIC	European Chemical Industry Council
EC	European Community
HMPI	Her Majesty's Pollution Inspectorate (United Kingdom)
IIASA	International Institute for Applied System Analysis
MEPs	Members of European Parliament
NEPP	(Dutch) National Environmental Policy Plan
OECD	Organization for Economic Cooperation and Development
SEA	Single European Act
STOA	Scientific and Technological Option Assessment
UBA	Umweltbundesamt (German Federal Environmental Agency)
UKDOE	United Kingdom Department of Environment
UNECE	United Nations Commission for Europe
UNEP	United Nations Environmental Program
UNCED	United Nations Conference for Environment and Development
VROM	Volkshuisvesting, Ruimtelijke Ordening en Milieu (Ministry of Housing, Physical Planning and Environment)
WCED	World Commission on Environment and Development

"No," Malcolm said. "My point is that life on earth can take care of itself. In the thinking of a human being, a hundred years is a long time. A hundred years ago, we didn't have cars and airplanes and computers and vaccines. . . . It was a whole different world. But to the earth, a hundred years is *nothing*. This planet lives and breathes on a much vaster scale. We can't imagine its slow and powerful rhythms, and we haven't got the humility to try. We have been residents here for the blink of an eye. If we are gone tomorrow, the earth will not miss us."

"And we very well might be gone," Hammond said, huffing.

"Yes," Malcolm said. "We might."

"So what are you saying? We shouldn't care about the environment?"

"No, of course not."

"Then what?"

Malcolm coughed, and stared into the distance. "Let's be clear. The planet is not in jeopardy. *We* are in jeopardy. We haven't got the power to destroy the planet--or to save it. But we might have the power to save ourselves."

From M. Crichton, Jurassic Park

INTRODUCTION

During the past decade, European countries have expanded their national agendas to include elimination or at least reduction of threats to health and the environment posed by hazardous wastes. Various regulatory frameworks have emerged in Europe: (1) programs to encourage waste avoidance and minimization; (2) national control systems to improve hazardous waste management; (3) standards and procedures to provide appropriate hazardous waste storage, treatment and disposal; (4) controls and bans on transboundary movement of hazardous waste; and (5) programs to clean up abandoned hazardous waste sites.

In adopting these regulatory frameworks, European governments have indicated a "hierarchy" of preferred management options. Waste avoidance or reduction at the source is preferred to recycling. Recycling is preferred to treatment or incineration aimed at destroying, converting or immobilizing hazardous materials. Disposal on land and at sea are considered the least preferred options; in some cases they are prohibited.

Marked differences can be observed among the strategies selected by the European Community (EC) member states to reduce hazardous waste and the extent to which this objective has been achieved. Past attempts at waste minimization have not been very successful. Indeed, European countries have relied mainly on treatment and disposal while the total amount of hazardous waste has actually increased.

The creation of the European Single Market by the end of 1992 and the expected acceleration of economic growth in the EC countries will exacerbate the problem of hazardous waste management by increasing the amount of waste produced each year in the European Community, with the likelihood of saturating existing European treatment and disposal facilities, and increasing the

transboundary movement of hazardous waste.

This study analyzes the attempts by four European countries to implement hazardous waste minimization policies as part of comprehensive waste management plans. I summarize what has been learned from the success and failure of efforts at hazardous waste minimization in Germany, Italy, the Netherlands and the United Kingdom (UK). In light of my findings, I assess the policy options to achieve hazardous waste minimization and the conflicts that are likely to emerge. I also assess the impacts that the creation of a single European market may have on hazardous waste management and the difficulties of achieving EC-wide policy harmonization.

I begin with four key assumptions. First, in the EC countries there is a gap between policy intent and actual implementation of national hazardous waste policies, particularly regarding waste minimization. I have observed similar outcomes across different institutional settings and regulatory schemes, and have searched for patterns of implementation that could explain these outcomes.

My second assumption is that inherent in the implementation of hazardous waste policies are some strategic conflicts and trade-offs that must be made by the different actors involved in the policy-making process. I identify the policy options, interests, constraints, and trade-offs involved in hazardous waste minimization efforts. I then suggest that success in implementing measures aimed at minimizing hazardous waste depends on the participation of social, economic, and political actors in drafting these measures and on the ability of European public agencies to resolve these conflicts.

Third, I assume that the interactions between the national and international dimensions of the hazardous waste issue are likely to affect the success of national policy. One of the major challenges facing the implementers of hazardous waste policy is the highly integrated worldwide market in chemical

production and waste management. The success of one nation's hazardous waste policies is increasingly influenced by the policies of all other nations. In Europe, the creation of a single market will exacerbate this interdependence and lead to new conflicts. I assess the direct and indirect impacts on national hazardous waste policies of market integration without a unified regulatory system.

Finally, I assume that harmonization of hazardous waste policies across EC member states is crucial to achieving hazardous waste minimization. I assess the opportunities and constraints of harmonizing these policies and suggest that harmonization is not primarily a technical problem of standardization. Instead, it requires facing the differences in institutional settings and regulatory philosophies across EC member states and the conflicts that are likely to emerge. Policy harmonization can be achieved through a consensus-building process involving key institutional, economic, and political actors.

My study is organized into two sections. Part 1 (Chapters 1 through 3) explores the gap between the intended and the actual impact of national policies aimed at minimizing the production of hazardous wastes and reducing their environmental threats. Part 2 (Chapters 4 and 5) focuses on the relationships between the European and national dimensions of the hazardous waste management problems and the EC-wide attempts to harmonize hazardous waste policies.

Within Part 1, Chapter 1 analyzes the EC regulatory framework and the national policies and regulatory systems adopted in the Germany, Italy, the Netherlands and the UK. Chapter 2 reviews the attempts by public agencies to implement strategies for hazardous waste minimization in each national context. In Chapter 3, I propose a conflict assessment approach to identifying the policy options, interests, constraints, and trade-offs involved in hazardous waste minimization.

In Part 2, Chapter 4 analyzes the interdependence between policy implementation and policy harmonization across European countries and assesses the new conflicts that will arise from the creation of a single European market. Chapter 5 focuses on the perception of policy makers by examining the results of a survey at the European Parliament in order to assess the chances of achieving hazardous waste minimization in the future.

The conclusion will discuss the policy implications of my findings. First, I suggest a new definition of the hazardous waste management problem which acknowledges the plurality of agents, interests, and strategies involved. Second, I discuss the problems of implementation and harmonization of hazardous waste policies and how they are related to each other. Third, I propose recommendations for transforming this definition into practical actions to be taken by national governments and the EC to improve the chance of minimizing hazardous waste.

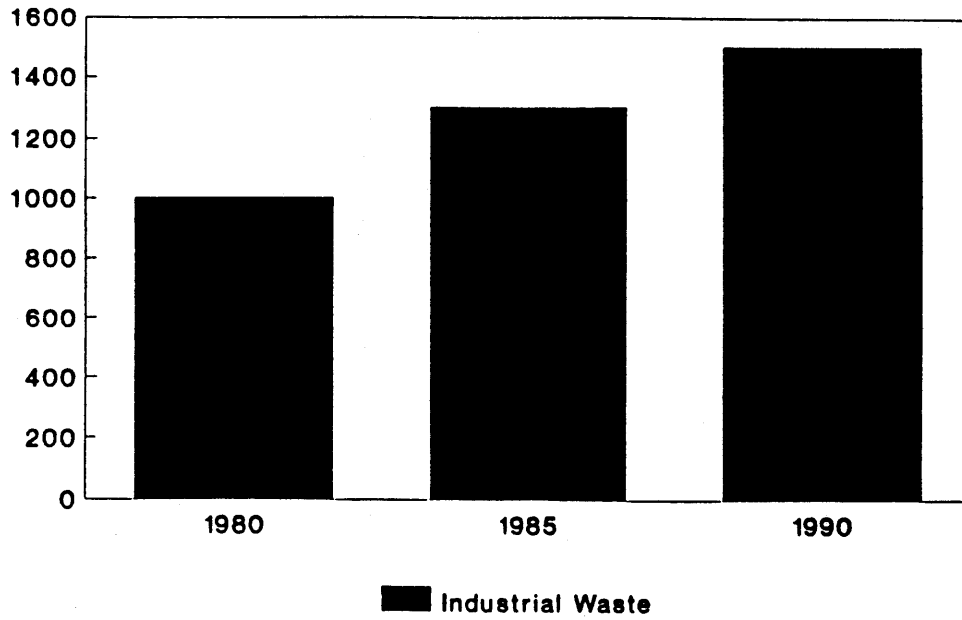
CHAPTER 1
HAZARDOUS WASTE MANAGEMENT:
A CROSS-NATIONAL PERSPECTIVE

During the last decade the minimization of hazardous waste has emerged in Western European countries as a public policy objective. In response to increasing concern about the threats to human health and the environment posed by hazardous by-products of industrial processes, the European Community's (EC) environmental policy has evolved from pollution control to pollution prevention. In accordance with this evolution, the EC policy for waste management now places increased emphasis on the minimization of hazardous waste and indicates that waste prevention is the preferred option for managing hazardous residuals. Indeed, several EC countries have adopted specific strategies to reduce the amount and the toxicity of hazardous wastes. Nevertheless, in spite of important progress in hazardous waste regulation, the EC countries still rely mainly on hazardous waste treatment and disposal while the total amount of hazardous waste has actually increased. The 24 million tons of hazardous waste recently produced each year in OECD Europe (Figures 1.1 and 1.2) are expected to reach 30 million by the end of 1992. It is this gap between the intent of public policy and the results thus far that is the focus of my research.

This chapter provides the evidence of policy failure and sets the framework for the analysis. First, I examine the evolution of the EC's hazardous waste policy and the role of EC directives in harmonizing the regulation of hazardous waste in the EC member states. I assess the current progress and anticipate the new conflicts that discrepancies among regulatory systems in Europe will arise with the creation of a single market. Second, I analyze national policies and regulatory systems for the management of hazardous waste in Germany, Italy, the Netherlands, and the United Kingdom (UK). Finally, I compare hazardous waste policies in each country by focusing on regulatory strategies, the extent of centralization of decision making, the reliance on market or planning approaches to waste management, the degree of public access to information and rulemaking, and the handling of scientific controversies in policy making.

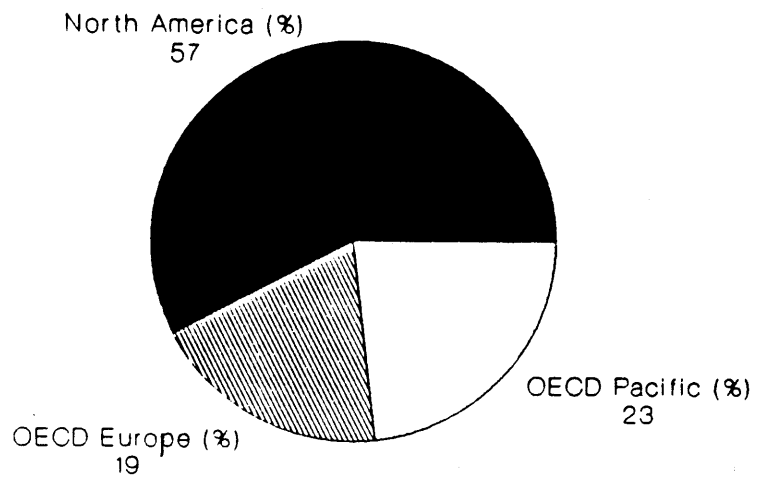
Figure 1.1

Industrial Waste Production OECD Countries (million tons)



Source: OECD 1991

Industrial Waste Production OECD Countries



Source: OECD 1991

Figure 1.2

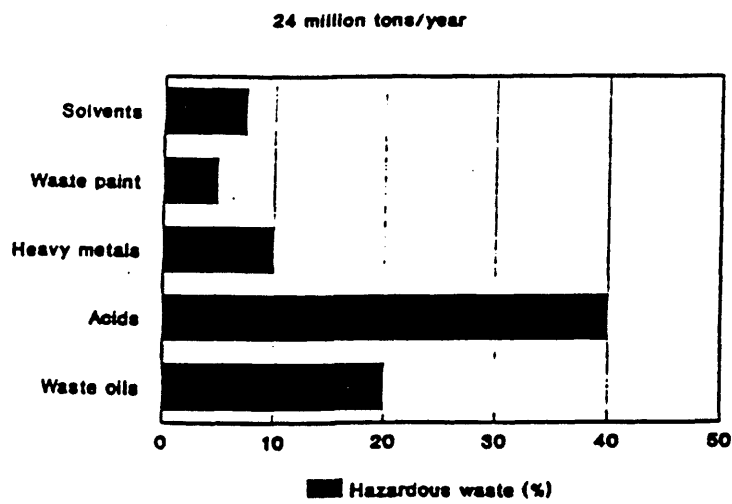
Hazardous Waste Production

EC Countries	Hazardous waste (1000 tonnes)*
Belgium	700
Denmark	500
France	3,997
Germany	4,870
Greece	300
Ireland	76
Italy	3,774
Luxembourg	80
Netherlands	1,000
Portugal	1,000
Spain	1,708
United Kingdom	3,700

* Estimates based on GNP

Source: EC, 1992

Hazardous Waste Composition



Source: EC, 1992

1.1 The EC policy for waste management

Hazardous waste policies emerged in Western Europe at the end of the 1970s in response to the discovery of highly contaminated areas in Germany (Georgwerder-Hamburg and Muncehagen), Denmark (Northwestern Jutland), and the Netherlands (Lakkerkek). The disappearance of some highly toxic waste (41 barrels containing dioxin) from the Seveso clean-up in Italy and its subsequent discovery in an illegal location in France also raised concerns about the export of hazardous wastes.

The European Community¹ (EC) and its member state national governments made the regulation of hazardous waste a priority in their political agenda. European countries adopted various regulatory frameworks to encourage waste minimization, secure safe management, and control transboundary movement of hazardous waste. The EC Council adopted a framework directive on waste to harmonize waste management across its Member States (Directive 75/377/EEC)² and two specific directives to regulate hazardous waste which specify objectives, standards, and procedures for promoting waste minimization and ensuring safe management of non-recoverable hazardous residuals (Directive 78/319/EEC),³ and for controlling their cross-country movement (Directive 84/613/EEC). The directive is the main

1. The European Economic Community (EEC) was established by the Treaty of Rome in 1957. Presently it includes 12 Member States: Belgium, Denmark, the Federal Republic of Germany, France, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, and the United Kingdom. The institutions of the European Community (EC) are: the Commission, which is responsible for proposing EC policies and drafting EC Directives; the Council, composed of the heads of the 12 governments and the president of the Commission, which has legislative power; the Parliament, directly elected by the Member States, which has a co-legislator role; and the Court of Justice appointed by the Parliament and by the Council, which interprets and enforces the EC law.

2. Directive 75/337/EEC has been recently amended by the new framework Directive on Waste 91/156/EEC.

3. Directive 78/319/EEC has been recently amended with Directive 91/689/EEC on hazardous waste, *Official Journal of the European Communities*, No L 377/20.

tool established with the EEC Treaty of Rome which empowers the Community to set the environmental quality standards, implementation procedures, and monitoring systems that must be adopted by the member states within a designated time limit.⁴

While national government policies were evolving in different directions in response to context-specific hazardous waste issues, the focus of the EC hazardous waste policy has been on policy harmonization. The EC set forth principles to guide this process of harmonization and the environmental programs of the Community.⁵

Evolution of the EC environmental policies

The First Environmental Action Program,⁶ adopted in 1973, introduced a broad notion of environmental protection which included pollution prevention, maintenance of ecological balance, rational use of natural resources, and improvement of the quality of life. This program emphasized the need for pollution control strategies and remedial actions at the Community level. At that time the scope of EC environmental policy was limited by the fact that no specific reference to the competence of the Community on environmental matters was included in the original Treaty of Rome.⁷ EC environmental policy was

4. EC legislative instruments are regulations and directives. As specified in the Treaty of Rome, regulations are binding and directly applicable to member states, whereas directives "shall be binding as to the result to be achieved" but leave to member states "the choice of form and methods." EC directives allow member states greater latitude in implementing the directive's provisions while meeting overall goals set by the Community. "European Community Environmental Legislation 1967-1987" Commission of the European Communities.

5. EC Environmental Action Programs set out the objectives, principles, priorities, and implementation measures of the Community. Since 1973, the European Community has adopted four 5-year Action Programs.

6. Council of the European Communities, "First Environmental Action Program," *Official Journal of the European Communities* No. C112 of 20/12/1973.

7. Treaty of Rome.

consequently built on Article 100 of this Treaty which concerns the elimination of economic barriers.

During the last 18 years EC environmental policy has extended its scope and strengthened its role (Table 1.1). The emphasis of the EC Action Programs has shifted from pollution control to prevention (Table 1.2). The Second (1977-81) and the Third (1982-86) Action Programs⁸ assign high priority to prevention strategies. The Fourth Environmental Action Program,⁹ adopted in 1987, confirms the priority of prevention and places special emphasis on clean technologies and clean products. The practical measures indicated by this program to achieve prevention are 'substance-oriented' and 'source-oriented' strategies. Moreover, the Fourth Environmental Action Program states that protection of the environment must become an integral part of EC and national economic and social policies in accordance with the principles set forth in the Single European Act.¹⁰

Increased emphasis on the harmonization of environmental policies emerged in the Community in the process of establishing objectives and criteria for the integration of the European market. Market distortions may result from the removal of the internal barriers in countries with different environmental regulations, thus affecting national efforts towards increasing their environmental standards. Those same market distortions may limit the achievement of the full economic gains of completing the internal market.

8. Council of the European Communities, "Second Environmental Action Program," *Official Journal of the European Communities* No. C 139 of 13/6/1977, and "Third Environmental Action Program," *Official Journal of the European Communities* No. C 46 of 17/2/1983.

9. Council of the European Communities, "Fourth Environmental Action Program," *Official Journal of the European Communities* No. C 328, 7/12/1987.

10. The Single European Act of 1987 introduces a series of amendments to the 1957 Treaty of Rome. While the Treaty of Rome did not provide specific provisions for environmental protection, the Single European Act has added a new Title VII 'Environment' (Article 130 R, S & T) to Part Three of the EEC Treaty establishing the foundations and policy of the Community.

Table 1.1
Scope of EC Environmental Action Programmes

	1973-76	1977-81	1982-86	1987-92	1992-2000
Air quality	X	X	X	X	X
Climate change					X
Acidification				X	X
Water quality	X	X	X	X	X
Urban areas	X	X		X	X
Fauna and flora		X	X	X	X
Biodiversity				X	X
Marine pollution			X	X	X
Coastal areas	X	X		X	X
Energy	X				X
Waste management		X	X	X	X
Transfrontier pollution			X	X	X
Chemicals			X	X	X
Clean technologies			X	X	X
Soil protection				X	X
Pesticides		X		X	X
Biotechnologies				X	X
Nuclear safety				X	X
Products					X
Packaging			X	X	X
EIA			X	X	X
Information		X		X	X
Cooperation					X
Economic aspects		X	X	X	X

Table 1.2
Focus of EC Environmental Action Programs

	1973-76	1977-81	1982-86	1987-92	1992-2000
Sustainable Development					X
Substance Control				X	X
Sources Control			X	X	X
Emission Control		X	X	X	X
Pollution control	X	X	X	X	X

The Single European Act (SEA), which entered into force in July 1987, for the first time introduced three new provisions conferring express environmental competence on the Community.¹¹ Articles 130R, 130S and 130T of the SEA establish respectively the scope of the Community competence on the environment, the voting procedure to enact environmental legislation, and the extent to which member states may introduce more stringent measures. The EC environmental policy has gained new importance especially in view of the European economic and political union established with the Maastricht Treaty.

The strengthened role of EC environmental policy is reflected in the new approach of the Fifth EC Environmental Program,¹² "Toward Sustainability," which establishes specific targets to be achieved up to the year 2000 on seven key issues. One of the key targets of the Program is to implement the hierarchy of waste management options established within the EC waste management strategy. This goal is being pursued through measures aimed at preventing waste at sources, encouraging reuse and recycling of waste, prioritizing waste streams, developing a rational network of disposal facilities, and minimizing the movement of waste.¹³ Specific actions established in the Fifth EC Environmental Program are summarized in Table 1.3.

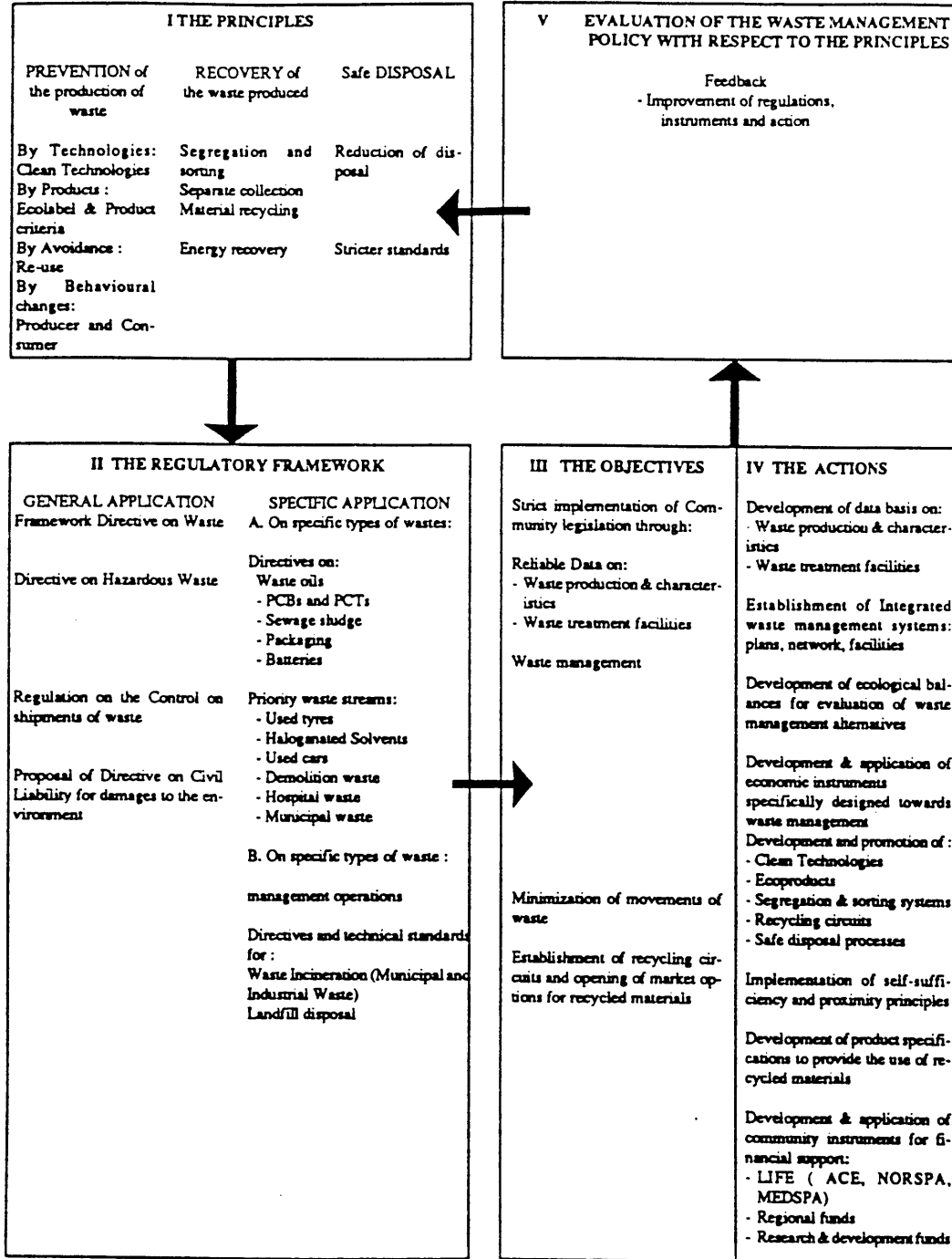
11. The Single European Act, which set the conditions for progressively creating the internal single market, has introduced substantive changes to the EEC Treaty of Rome by according express competence to the community in environmental matters. Article 130R establishes the objectives, principles, and conditions for the Community action. Article 130S maintains that decisions should be made unanimously, though it allows the Community to define specific matters on which decisions may be made by a qualified majority. Article 130T specifies that Member States may introduce more stringent measures provided they are compatible with the overall treaty.

12. Council of the European Communities, "Fifth Environmental Action Program: Toward Sustainability" Draft, 1992.

13. Ibid, Section 5.7, Waste Management; EC 5th EP.

Table 1.3

STRATEGIC CHART FOR A COMMUNITY MANAGEMENT POLICY ON HAZARDOUS AND OTHER WASTES



Source: CEC, "Toward Sustainability" March 1992

The minimization of hazardous waste

In line with the change in the focus of the EC environmental policy, the directives adopted by the European Community to regulate hazardous waste have placed increasing emphasis on waste prevention. Table 1.4 summarizes the relevant EC Directive on waste. At the EC level, hazardous waste is regulated by the Directive on Toxic and Dangerous Waste,¹⁴ 78/319/EEC, approved in 1978 and recently amended by the new Directive on Hazardous Waste, 91/689/EEC approved in December 1991¹⁵. Directive 319 provided the basis for harmonizing national hazardous waste regulatory schemes, emphasizing that Member States shall take steps to prevent hazardous waste generation (Art. 4) and measures to dispose of hazardous waste in an environmentally safe manner (Art. 5). The directive defines "toxic and dangerous waste" with a list of 27 substances and materials selected as requiring priority consideration (Art. 1) (Table 1.5). It establishes that member states must adopt national plans for hazardous waste management (Art. 12). It also requires member states to establish authorities for planning, organizing, authorizing, and supervising hazardous waste management (Art. 6), for collecting data (Art. 8), for licensing (Art. 9), and for inspecting hazardous waste facilities (Art. 15). Member States must submit a report on hazardous waste management every three years (Art. 16).

The most important modification introduced by the new Directive on hazardous waste of 1991 is a new definition of hazardous waste. The term hazardous waste refers to a list of wastes to be drawn up by the Commission with the member states on the basis of Annex I and Annex II of the Directive and which have one or more properties listed in Annex III. The list will take into account the origin and composition of the waste and, where necessary, limit

14. Council Directive 78/319/EEC on Toxic and Dangerous Waste. *Official Journal of the European Communities* No. L 84, 31/3/1978.

15. Council Directive 91/689/EEC on hazardous waste, *Official Journal of the European Communities*, No L 377/20.

Table 1.4

EC Directives on Waste

SUBJECT	EC
Waste Management	
Municipal Waste	Directive 75/442/EEC Directive 91/196/EEC
Industrial Waste	Directive 75/442/EEC Directive 91/196/EEC
Hazardous Waste	Directive 76/403/EEC Directive 78/319/EEC Directive 91/698/EEC
Landfill	Directive proposal
Incineration	Directive proposal
Waste Minimization	
Minimization targets	Strategic Discussion Tables
Recycling	
Ecolabelling	Regulation
Packaging	Directive proposal
Eco-auditing	Directive proposal
Waste movements	Directive 84/631/EEC Directive 86/279/EEC

Table 1.5

List of Toxic and Dangerous Substances and Materials
(Directive 78/319/EEC)

<i>This list consists of certain toxic or dangerous substances and materials selected as requiring priority consideration</i>	
1	Arsenic: arsenic compounds
2	Mercury: mercury compounds
3	Cadmium: cadmium compounds
4	Thallium: thallium compounds
5	Beryllium: beryllium compounds
6	Chrome 6 compounds
7	Lead: lead compounds
8	Antimony: antimony compounds
9	Phenols: phenol compounds
10	Cyanides, organic and inorganic
11	Isocyanates
12	Organic-halogen compounds, excluding inert polymeric materials and other substances referred to in this list or covered by other Directives concerning the disposal of toxic or dangerous waste
13	Chlorinated solvents
14	Organic solvents
15	Biocides and phyto-pharmaceutical substances
16	Tarry materials from refining and tar residues from distilling
17	Pharmaceutical compounds
18	Peroxides, chlorates, perchlorates and azides
19	Ethers
20	Chemical laboratory materials, not identifiable and/or new, whose effects on the environment are not known
21	Asbestos (dust and fibres)
22	Selenium: selenium compounds
23	Tellurium: tellurium compounds
24	Aromatic polycyclic compounds (with carcinogenic effects)
25	Metal carbonyls
26	Soluble copper compounds
27	Acids and/or basic substances used in the surface treatment and finishing of metals

values of concentration.

The export of hazardous wastes is regulated by the Directive on Supervision and Control within the European Community of the Transfrontier Shipment of Hazardous Waste,¹⁶ 84/613/EEC, approved in 1984. Directive 613, amended in 1986 with Directive 86/279/EEC,¹⁷ introduces a notification and authorization system for hazardous waste exports aimed at reducing and controlling the waste trade. Transfrontier shipments must also comply with a manifest that provides specific information on the amount and type of hazardous waste transferred. Member states must submit a bi-annual report on the implementation of this directive, so that the EC can control waste trade within and outside the Community.

A proposal for a Council Regulation on the supervision and control of transfrontier shipment of waste meant to replace the Council Directive 84/631/EEC is currently under discussion. This new regulation implements the new rules established with the Basel Convention signed on 22 March 1989 and the prohibition of waste export to African, Caribbean and Pacific (ACP) countries contained in the Lome IV Convention¹⁸ signed on 15 December 1990. New provisions are also proposed to face the likely increase of waste movement due to the removal of border controls between EC member states.

Additionally, several new Council directives and regulations related to waste management have been drafted or submitted for approval by the EC Commission. As a further step towards harmonization of waste treatment and

16. Council Directive 84/613/EEC on Supervision and Control within the European Community of the Transfrontier Shipment of Hazardous Waste. *Official Journal of the European Communities* No. L 362, 13.12.84.

17. Council Directive 86/279/EEC. *Official Journal of the European Communities* No. L 181, 4.7.86.

18. Fourth ACP-EEC Convention, December 15, 1989, Article 39.

disposal standards across the Community, the Commission has drafted two new directives: on landfills¹⁹ and on incineration of hazardous waste.²⁰ Also, the Commission has proposed a Council Directive on civil liability for damage caused by waste²¹ in order to harmonize liability schemes across EC member states. As far as products are concerned, the EC Council has recently approved a Community Eco-label²² to be awarded to products which meet specified ecological criteria. A Council Directive has also been adopted to impose a labeling scheme for batteries that contain mercury, cadmium and lead and which require separate collection and recycling. Finally, the Commission has issued a proposal for a Council directive on packaging meant to harmonize measures for the minimization of packaging waste and of hazardous substances in packaging materials.

The implementation gap

With the exception of Greece and Portugal, specific regulatory schemes for hazardous waste management have been adopted by all the EC member states (Table 1.6). A hierarchy of preferred hazardous waste management options is implied in the regulatory systems adopted by European countries, though different emphasis is placed by the main actors involved in the policy arena at the Community level. Waste prevention is preferred to waste reuse and recycling, which are preferred to waste treatment or incineration. Disposal is considered the least preferred option and in some cases is prohibited.

19. Commission of the European Communities, "Proposal for a Council Directive on Landfill," COM(91) 102 final of 22 May 1991.

20. Commission of the European Communities, Draft proposal on incineration of hazardous waste, 1991.

21. Commission of the European Communities, "Proposal for a Council Directive on civil liability for damage caused by waste" COM(89) 282 final - SYN 217, Brussels, 15 Sept. 1989; and "Amended proposal" COM(91) 219 final - SYN 217, Brussels 27 June 1991.

22. Council Regulation on a Community Eco-label award scheme (No. to be assigned before publication).

Table 1.6

Hazardous Waste Regulations in EC Countries

COUNTRIES	REGULATION	YEAR
Belgium	Law on Toxic Waste	1974
	Royal Order on Toxic Waste	1976
Denmark	Law on the Disposal of Chemical and Oil Waste	1972
	Notification on Chemical Waste	1976
France	Law 633 on Waste Disposal and Material Recovery	1975
	Decree on Treatment Facilities	1980
	Decree on the Transport of Dangerous Waste	1985
Germany	Federal Waste Disposal Act	1972
	Regulation on the Definition of Waste	1977
	Waste Avoidance and Management Act	1986
Greece		
Ireland	European Communities Regulations (Disposal of Toxic and Hazardous Waste)	1982
Italy	Decree 915	1982
	Law 441	1987
	Law 475	1988
Luxembourg	Law on the Disposal of wastes	1980
Netherlands	Waste Product Act	1977
	Chemical Waste Act	1979
Portugal		
Spain	Law 20	1986
	Royal Decree 833	1988
United Kingdom	Control of Pollution Act	1974
	Control of Pollution (Special Waste) Regulations	1980
	Environmental Protection Act	1990

Source: Data provided by Environmental Ministries in EC Member States

The appropriate hierarchy for managing wastes was adopted by OECD countries by an Act of the OECD Council in 1976 (Table 1.7). Different views concerning the articulation of hazardous waste management options have emerged at the Community level and in the various EC member states. The EC Commission approach defines waste prevention so as to include the overall measures aimed at reducing the amount of hazardous waste and emphasizes its priority as a long-term objective. In the short term, recycling, treatment and safe disposal, in order of preference, are the options to be considered in drawing up hazardous waste plans. On the other hand, industrial associations propose a broader definition of hazardous waste minimization which includes source reduction, changes in technology and/or input material, reuse and recycling, and treatment techniques aimed at reducing the amount and toxicity of waste streams. Environmental organizations reply that product substitution is the preferred option and detoxification is the only safe treatment method to be considered when waste prevention is not achievable. In the environmentalist's view, disposal methods on or into land are not considered to be an acceptable strategy for hazardous waste management (Table 1.8) .

In spite of these differences, there is a substantial agreement that hazardous waste minimization strategies must be preferred to other hazardous waste management options.

To date, actual attempts at hazardous waste minimization have not been very successful. OECD Europe generates 300 million tons of industrial waste per year, of which between ten and fifteen percent is hazardous waste. The rate of increase of these wastes between 1985 and 1989 was roughly 2 percent per annum, though there are significant differences among EC countries, as shown in Figure 1.3. Treatment and disposal -- rather than waste prevention, recycling and reuse -- are the predominant options for waste management, as shown in Figure 1.4. Currently, on average more than 70% of the hazardous wastes generated in Europe are disposed of into or onto land, about 8% are incinerated

Table 1.7

Waste Management Hierarchy

1. Reduce generation of wastes, e.g. by more efficient processes in manufacturing, reduction of disposable material in consumer goods or increase of durability in products;
2. Separate usable components of the waste at their source, e.g. by more efficient control of effluents from manufacturing processes, separation of paper, glass, plastic and metals by householders, or concentration of used tires or oil at collection centers;
3. Reuse of waste products directly if possible, e.g. return of an effluent to the production process as in steelmaking or cement kiln operations, burning of household wastes to recover energy or exchange of material which is a waste from one process but may be a feedstock for another process;
4. Transformation or other physical or chemical treatment in order to recycle usable materials from waste, e.g. magnetic separation of ferrous scrap from household waste and subsequent use of the material to prepare ferrous products, reclamation of non-ferrous metals from mixed industrial wastes by thermal processes, re-refining of waste, lubricating oils, or distillation and regeneration of spent solvents;
5. Destruction of the waste by physico-chemical treatment or incineration, e.g. neutralization by mixing alkaline and acid wastes or burning of pumpable liquid waste or solid wastes.
6. Permanent storage of the waste in or on land;
7. Dumping at sea (to be avoided insofar as possible).

Source: OECD, 1976.

Table 1.8

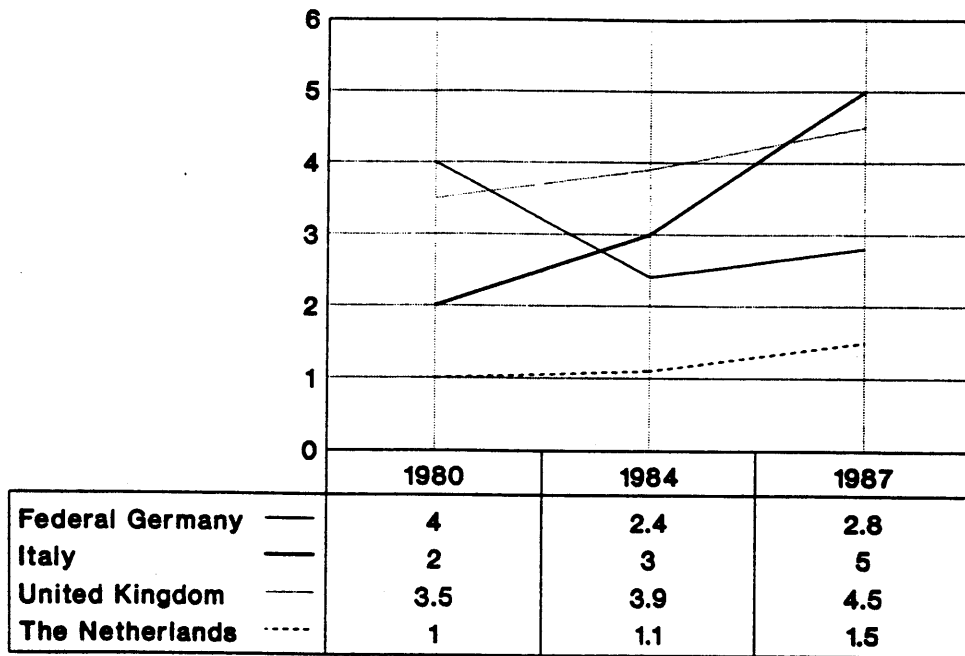
Approaches to Waste Minimization

EC Commission	NGO's	CEFIC
(1) Waste prevention	(1) Product substitution	(1) Waste minimization
(2) Recycling and reuse	(2) Waste prevention	(2) Residue recovery
(3) Treatment and incineration	(3) Reuse	(3) Adequate waste characterization
(4) Landfill	(4) Recycling	(4) Disposal methods
	(5) Detoxification	
	(6) Interim storage	

Source: EurEco, 1989.

Figure 1.3

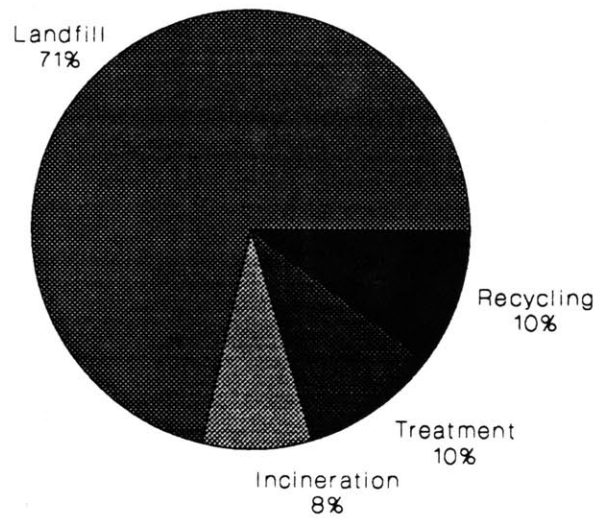
**Hazardous Waste Production
(million tons)**



Source: Based on data provided by National Ministries for the Environment

Figure 1.4

Hazardous Waste Management EC Countries (average)



Source: Based on data provided by National Ministries for the Environment

and 10% are submitted to physico-chemical treatment, while only 10% are recovered as secondary material.

The increasing amount of hazardous waste transported across Western European countries and from Western Europe to Eastern Europe and to less developed countries (up to 2 million tons in 1988) shows that generators escape the stringent national standards and the higher costs of waste disposal aimed at promoting waste minimization and manage to find less expensive alternatives elsewhere (Figure 1.5). According to the OECD, the aggregate annual marginal savings to generators in Europe represents roughly 200-250 million ECU. The potential avoided costs estimated by the OECD average 250 ECU per ton, considering the overall cost of packaging, labeling, and transportation. This is true even considering distances over 5,000 km.

The information gap

One major difficulty in assessing the implementation of hazardous waste policies in Europe arises from the unreliability of official statistics on waste. Hazardous waste statistics are particularly unreliable since control systems are still not fully and uniformly implemented. Thus far, only a few European countries have adopted regulatory requirements for industries to report on the amount of hazardous waste generated. To date, there is no realistic inventory of hazardous waste production, management and recycling by type of waste or activity generating them. Estimates also have a wide range of error.

Assessing national trends in the production of hazardous waste is extremely difficult for several reasons. First, systematic data collection is recent and actually refers to the enactment and implementation of hazardous waste regulations. Little data are available on waste production before 1985. Most recent data are based on ad hoc surveys or estimates. A second problem is that the definitions of hazardous waste and classification systems have changed over

Figure 1.5

Hazardous Waste Trade

COUNTRY	EXPORT	IMPORT
Austria ^a	90,622	54,680
Belgium ^a	15,090	
Denmark ^b	9,000	
Germany ^a	1,058,067	
Finland ^b	65,000	
France ^a	45,000	249,340
Ireland ^b	14,000	
Italy ^c	50,000	
Luxembourg ^b	4,000	
Norway ^b	8,000	
Spain		
Sweden ^b	30,200	
Switzerland ^b	108,000	
The Netherlands ^a	250,000	
UK ^a		80,000

Sources: (a) National Ministries for the Environment

(b) OECD

(c) Servizi Industriali

time. In addition, most waste still escapes control and therefore is often not recorded in official statistics. Consequently, historical data on the production, management and movement of hazardous waste are seldom accurate or consistent.

Comparing these data across European countries is made even more difficult because of the differences in the definitions, classification systems, methods, and accuracy of data collection systems. This is particularly evident if we compare international and national official statistics across the European Countries. A recent study carried out by the Commission of the European Communities identifies four key issues in national waste statistics across member states. These issues are the scope, detail, accuracy and comparability of national waste statistics.

The present state of statistics tells us more about the implementation of notification and reporting systems across countries than it does about current trends of hazardous waste production and management in these countries. In spite of efforts by the European Community to harmonize hazardous waste regulations across its member states, marked differences remain in the control systems and the extent to which member states have adopted the EC Directives.

The EC policy response

In September 1989, the European Commission delivered a new Community strategy for waste management to the European Council of Ministers and the Parliament. The new Community's strategy was designed to respond to the limited progress of the EC waste policy and to confront the existing divergence across national regulatory frameworks. In light of the integration of the European market, the harmonization of national waste management policies is seen to be central to the success of the new Community strategy.

Five strategic guidelines were issued to address five policy priorities: (1) prevention, (2) recycling and reuse, (3) optimization of final disposal, (4) regulation of transport, and (5) remedial action. The new Community strategy addresses waste management as a whole, though it gives priority to hazardous waste issues. In accordance with the principles for action on the environment that are set up in the Single European Act,²³ the new strategy establishes that preventive action should be taken, that environmental damage should, as a priority, be rectified preferably at the source, and that the polluter should pay.²⁴

The Community strategy specifies the means for implementing the preferred waste management options. The Commission sets out guidelines for turning the waste problem from an environmental problem into a resource with positive economic/social value. The guideline on waste prevention places increased emphasis on the development of clean technologies and clean products by increasing financial support to demonstration projects, setting up a European Information Network on environmental technologies (NETT), and adopting a European ecological labelling scheme for products. The second guideline on recycling and reuse outlines the measures to bring the waste back into the economic cycle. They include research on recycling technologies and practices, optimization of collecting and sorting systems, incentives for reduction of external costs, and support for the creation of marketing structures for recycled materials. The guideline on waste treatment and disposal underlines the problems emerging from the different patterns of regulation in the Member States and indicates the need to harmonize standards and optimize safe waste treatment and disposal. The movement of hazardous waste is addressed with a fourth guideline aimed at limiting and controlling waste trade within and outside the Community. This guideline introduces the "proximity" principle for

23. Title VII Environment Article 130R of the Single European Act. Official Journal of the European Communities No. 169, 29/06/1987.

24. Commission of the European Communities. "A Community Strategy for Waste Management," SEC (89) 934, Brussels, 18 September 1989.

waste disposal: wastes should be treated and disposed of as near as possible to their place of origin. Finally, the fifth guideline on remedial actions introduces the principle of civil liability for damage caused by waste and the proposal for adopting a European Directive.

The Community places particular emphasis on harmonizing national policies while it implements its strategy. Indeed, the success of achieving the minimization of hazardous waste in one member state is seen to be strongly influenced by the policies of the other member states. In Europe, the creation of the single market will exacerbate this interdependence and lead to new conflicts. The EC Commission is particularly concerned with the existing discrepancy in national regulations. In a recent report presented to the European Parliament on the implementation of the EC Directives on waste (75/442/EEC), waste oils (75/439/EEC), toxic and dangerous waste (78/319/EEC), and waste shipments (84/631/EEC), the EC Commission pointed out the limited and uneven compliance by member states.²⁵ Discrepancies in regulatory systems and in terms of stringency of regulations are expected to run counter the effective implementation of the EC efforts at minimizing hazardous waste.

In order to put into practice the five policy priorities for waste management, the Community emphasizes the need to improve enforcement and monitoring of EC Directive. Several studies by the EC Commission have pointed out the increasing number of complaints concerning infractions of environmental Directives by member states. Since 1978 the total number of infractions has increased from 25 to 188, as illustrated in Table 1.9. A more systematic and vigilant monitoring system is proposed to improve the compliance of the member states with the provisions adopted by the European Community.

25. Commission of the European Communities, "Report on the implementation by the Member States of the Community Waste Directives 75/442/EEC and 78/319/EEC" SEC(89) 1455, Brussels, 27 September 1989.

Table 1.9

Complaints and infringements detected by the Commission for Environment

YR	B	D	F	FRG	G	I	IT	L	NL	P	S	UK	Tot
82	1	1	4	-	-	1	2	-	-			1	10
83	1	1	1	1	1	-	1	-	1			1	8
84	-	1 2	-	-	2	-	4	-	-			2	9 2
85	- 1	3 1	3 2	1 1	14	- 1	2	-	3 1			11 3	37 10
86	7 3	6 6	44 5	1 2	53 3	- 5	13 3	- 2	2 3	2	5	32	165 32
87	4 3	14 6	16 1	4 3	17 3	9 1	16 6	- 5	4 1	7 2	29 4	30 3	150 38

Source: Commission of the European Communities, 1989

The need for an open policy process

EC policy makers recognize that European policies need to be reformed if their aims for minimizing hazardous waste are to succeed. The new EC strategy, however, fails to indicate how this reform will be accomplished. I believe that in order to overcome past policy failures, EC policy makers need to answer a central question: why have EC policies aimed at minimizing hazardous waste failed to accomplish their goal?

To answer this question we need to examine the interests, values and perceptions among the actors involved at the national and international level and the conflicts and tradeoffs to be made in minimizing hazardous waste. There are tradeoffs between environmental and economic priorities; between environmental risks and economic costs; and in the distribution of costs among different groups, geographic regions and generations. I assume that the different national and cross-national perspectives on hazardous waste issues play a major role. Thus, the way policies account for these different perspectives in the policy making process is central to its success.

The need for a new approach for drafting waste minimization plans has been recently advanced by the Waste Unit at the EC Commission (DGXI).²⁶ The new approach is based on an interactive process or "strategic discussion table" with the target groups that directly influence the production and consumption patterns which generate waste. This approach originates from recent attempts by the EC Commission to identify priority waste streams for which the Community must take measures to maximize waste prevention by regulating the waste life-cycle at its source.

26. EC Commission, "Proposal for a new approach to prevention and recovery of specific waste streams," Manual of the Services of the Commission of the European Communities, September 1990.

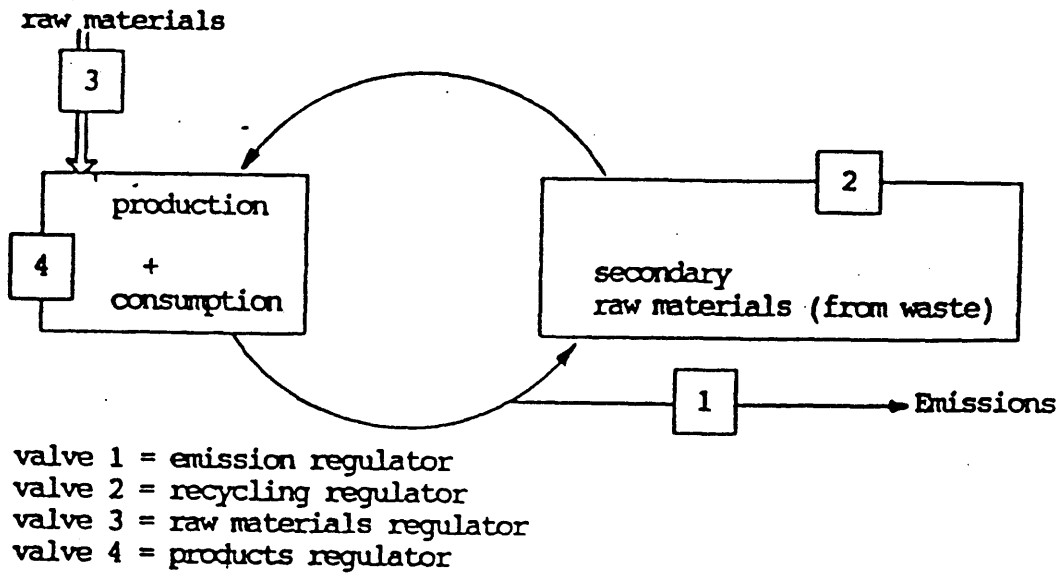
The Commission's proposal identifies four primary regulatory levels or "valves" in the waste life-cycle (Figure 1.6). The aim of the new approach is to develop measures that shift the Community control from valve 1 (emissions) to valve 4 (products). Aiming to change the behavior of the actors involved in the waste generation-handling-management chain, the Commission places a new emphasis on the need for active involvement by the target groups that are in a position to contribute to this change. The involvement will take place through an interactive process called "strategic discussion," bringing in independent facilitators to supervise the process. Participants in the "strategic discussion" include: the European Commission; and representatives of member states' governments and regional local authorities, industrial and agricultural organizations, trade, consumers' and environmental groups, and research institutes. The strategic discussion among the actors involved is aimed at examining priority waste streams, identifying the measures to be taken, and developing an implementation plan.

The new approach is designed to search for better solutions by concentrating economic and technical resources available at the national level, and also to improve the chances of implementation by bringing the policy target groups into the policy formulation process. Compared with the traditional approach, the main advantage of this method should be the increase in the chances for achieving consensus and for implementation to succeed (Figure 1.7). Additional advantages are the possibility that single states will no longer take individual actions that could have distorting effects on the community and that the EC will improve its capacity to monitor the effective implementation of its actions.

The process includes five steps. In the first step (preparation program phase), the participants will set out the organization, timetable, financing, and information inventory for the project. During the second step (analysis phase) they will identify the possible target options to reduce a specific waste stream,

Figure 1.6

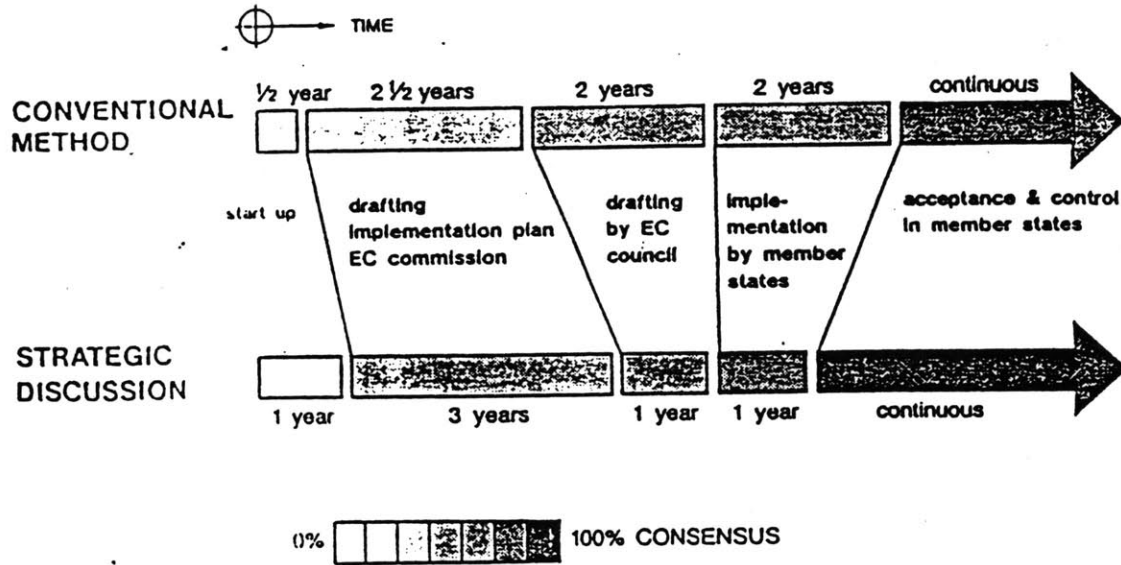
Waste Life Cycle



Source: EC, 1991

Figure 1.7

Comparison of Approaches



Source: EC, 1991

and the technical, economic and social constraints and the potential conflicts, cooperating to set specific targets for the waste stream under consideration. In the third, or strategy development phase, they will explore alternative solutions to achieve the established targets. The actual decisions on which strategies to be adopted will be made in the fourth phase, during which they will test the possible solutions against selected criteria for environmental, economic, technical, and social acceptability. In the final phase the participants will draw up an implementation plan which will convert the selected solutions into concrete measures.

The new approach is currently being tested by the Commission on two priority waste streams: used tires²⁷ and halogenated hydrocarbons.²⁸ Important progress has been made so far in both projects as regards the analysis of waste streams and the identification of waste reduction targets up to the year 2000. At present, the two project groups are exploring different options for drafting the implementation plans. New project groups are being set up on priority waste streams which have been selected on the basis of a cross-national survey. When it was first introduced, this new approach encountered a certain resistance on the side of the Commission representatives who felt their role was being narrowed. However, the success of the negotiations conducted so far together with the positive reaction of participants in both projects has had a significant impact on the Commission representatives and has changed their perception as to the effectiveness of the new approach.²⁹

27. Commission of the European Communities DGXI, Report on the second meeting of the EC Project Group Used Tires, Brussels 4-5 July 1991; Project Program Used Tires, Final Draft, September 1991; Used Tires Information Document (third draft), September 1991.

28. Commission of the European Communities DGXI, "Analysis of Priority Waste Streams Chlorinated Solvents," Report of the first meeting of the Project Group, Brussels, 7-8 March 1991.

29. See documents of project groups quoted above. Discussion with Mr. Hans Erasmus, Commission of the European Communities, DGXI, Brussels, January 1992.

The Commission's proposal that introduces this new approach is important for two reasons: it places special emphasis on implementation and it recognizes the need to involve the target groups -- the actual implementers of the EC waste minimization policy -- in the regulatory formulation process right from the start. In practice, however, this approach will raise several issues, which the Commission's document does not address. To share a common ground for discussion the different interest groups and nations must be satisfied with the criteria selected to measure and allocate the cost and benefits of hazardous waste minimization targets. Furthermore, different styles of regulation and differing relationships among social, economic and political actors within each national context are likely to produce quite different results across member states. The institutional difficulties and conflicts to empowering the Community on relevant environmental decisions are clear from the overall debate between 1985 and 1987 concerning the enactment of the Single European Act.

To implement the new approach, four important questions must be addressed. Who will participate in the process? Which economic, scientific, and social criteria should be applied to select the priority waste streams and determine the targets? Who will implement the agreements, and by which means? Who will monitor the implementation and how? I will return to these questions in Chapter 3, after analyzing the origin of the social, economic and political conflicts that underlie the hazardous waste management issues at the national and community levels.

1.2 National Policies and Regulatory Systems

Currently, the hazardous waste regulatory frameworks across Europe vary as to the definitions of hazardous waste, the control systems used, the collection and transportation practices, the standards for hazardous waste storage, treatment and disposal, and the minimization strategies.

Hazardous waste definitions differ in their classification criteria, comprehensiveness, and testing procedures. West Germany and Italy use an inclusive list of hazardous waste, and the United Kingdom relies on a range of testing procedures to determine the ignitability, carcinogenicity, corrosivity and toxicity of their compounds, while the Netherlands classifies toxic wastes based on the presence and concentration levels of 83 designated toxic compounds.

Hazardous waste regulatory schemes also vary as to their requirements and approaches. Italy, with its recent but still ineffective regulatory system, and the UK with its decentralized and discretionary system, contrast strikingly with West Germany and the Netherlands, where control systems are well articulated. In West Germany, the Federal Waste Act of 1986 introduces control over products and establishes a relatively comprehensive system of manifesting and licensing which provides a monitored path for each hazardous waste stream. In the Netherlands, the Chemical Waste Act of 1979 explicitly prohibits the dumping of toxic waste. The Netherlands has also introduced an integrated permitting system that requires industries to replace practices and manufacturing processes with low-waste technologies. The Italian and British approaches to hazardous waste management are less developed and to some extent less diversified.

There are also differences in the choice of legal (West Germany) versus economic (the Netherlands) instruments as well as differences in the degree to which states rely on public (West Germany) versus private (United Kingdom) waste disposal systems. The Netherlands uses a tax on waste production and disposal to encourage waste prevention and recycling. West Germany relies primarily on stringent standards and has developed successful systems of public financing and ownership of integrated hazardous waste management facilities. In the United Kingdom the management of hazardous wastes is nearly 98% in the hands of private industry and regulated by local authorities through site licensing, inspection, and legal enforcement.

Differences also emerge as to the degree of centralization (Italy) versus decentralization (West Germany and the United Kingdom) of regulatory authority and as to the formal (West Germany) versus informal (United Kingdom) approach to regulation. The Waste Disposal Act in West Germany sets statutory goals at the federal level but leaves substantial discretion to the *Länder* (states) in choosing how the statutory goals will be met. Even more extensive responsibilities for hazardous waste management are allocated to local authorities in the United Kingdom, where the central government confines itself to holding administrative appeals and providing technical advice. West Germany and the United Kingdom, however, differ markedly in their regulatory approach. The former relies on the enforcement of strict standards, the latter on voluntary compliance by industries.

Other differences across hazardous waste regulatory systems concern public access to rule-making as well as the way public agencies handle scientific disputes concerning the assessment and management of risk. The discretionary and flexible character of the UK system is associated with limited public access to rule-making. In the UK the flexibility of technical norms and the lack of transparency in risk assessment combine to undermine public control. The Netherlands, in contrast, uses precise inflexible technical standards and a formal risk-analysis approach. On the other hand, public interest groups in the Netherlands have more access to rule-making and formal recognition in government advisory committees than do their counterparts in the other three states.

Differences in technical definitions and control systems in Europe reflect varying political cultures, styles of regulation and institutional settings. Standards, procedures, and norms within each country are meant to regulate and influence different social and economic relationships. A comparative study by

the International Institute for Applied System Analysis³⁰ (IIASA) on hazardous waste management in Europe and the US points out how decisions, apparently technical, in different institutional contexts "are shaped by, and need to satisfy, different modes of organizational interaction, administrative procedures, and cultural traditions."³¹ In the IIASA study, Wynne contends that the efficacy of regulatory approaches is "relative to the context of surrounding norms, practices, and constraints, including cultural attitudes, economic behavior, and general administrative traditions."³² He asserts that "the first value of a comparative institutional analysis is to demonstrate more clearly the origins of divergent regulatory decisions and practices."³³

An overview of the different environmental regulatory systems in Europe is provided by Turner and Kromarek in their *Understanding US and European Environmental Law*.³⁴ To illustrate the substantive effect of these differences on the overall success of the Community's environmental policy, Ludwig Kramer, who introduces the EC policy, points out that

... the EEC is composed of twelve sovereign states; we have nine languages; we have twelve budgets; we have twelve, perhaps thirteen parliaments. Each nation that comes to Brussels to argue and discuss standards for the environment is ready to accept standards from Brussels, as long as they comply with its own national standards. That is the point of departure for EEC harmonization of national legislation.³⁵

The following pages present a brief sketch of the hazardous waste

30. B. Wynne, 1987. *Risk Management and Hazardous Waste: Implementation and the Dialectic of Credibility*. IIASA, Springer-Verlag.

31. B. Wynne, 1987, op. cit., p. 415.

32. B. Wynne, 1987, op. cit., p. 415.

33. B. Wynne, 1987, p. 415.

34. Turner T. Smith and Pascale Kromarek, 1989, *Understanding US and European Environmental Law*. Graham & Trotman/Martinus Nijhoff, London.

35. Ludwig Kramer, 1989, "The European Economic Community" in Turner T. Smith and Pascale Kromarek (editors), op. cit., p. 5.

management schemes in Germany, Italy, the Netherlands, and the UK. I emphasize the unique aspects of each institutional setting and identify the roots of the differing regulatory styles. This analysis attempts to explain how different institutional settings and regulatory approaches responded to the same highly controversial problem: the reduction of threats to health and the environment posed by hazardous wastes. Chapter 2 then focuses on the impact of specific waste minimization strategies in each national context through the development of selected case studies.

Germany

In the Federal Republic of Germany, the Constitution assigns to the federal authorities the power to develop the legal framework for environmental protection. Implementation and enforcement power is allocated to the eleven *Länder* (states). The *Länder* have access to the federal legislative process through the Bundestag, a federal legislative organ whose members are the heads of the *Länder* governments. The German Constitution leaves ample freedom to the *Länder* to organize their administrative structure and to enact state legislation and programs. The German Federal Environmental Agency (*Umweltbundesamt*, or UBA), established in 1974, assists in the implementation and enforcement of environmental pollution laws and has broad authority to conduct and fund research and development projects in the field of pollution control. The UBA, however, has no regulatory power.

Three structural principles introduced with the first Environmental Program of the Federal Executive in 1971 set the basis for most of the German environmental legislation. They are the principle of precaution, the polluter-pays principle, and the cooperation principle. The principle of precaution establishes that environmental policy is directed to minimize pollution at the source through preventive action and environmentally sustainable management of resources. The polluter-pays principle addresses the costs of pollution and establishes that

these costs must be borne by the polluters. The cooperation principle calls for cooperation among the actors involved in the decision-making process.

The Federal Republic of Germany has defined one of the most comprehensive frameworks for regulating hazardous waste. This framework includes three major laws: the Federal Waste Disposal Act of 1972 as amended by the Waste Avoidance and Management Act (1986); the Emission Control Law (1974); and the Dumping at Sea Act (1978). Hazardous wastes are listed in a catalog of special wastes which require specific treatment and disposal and are classified by type, primary characteristics, and origin. The special waste catalog was developed with the cooperation of the state governments by an intergovernmental organization called *Länderarbeitsgemeinschaft Abfall* (LAGA). In 1986 the list was expanded to include 200 hazardous wastes for which specific treatment and disposal methods are required.

Prevention and recycling of hazardous waste are promoted by a permitting system for industrial facilities, by a labelling system for products and, to some extent, by economic incentives. Under the Emission Control Law, in order to be licensed, industrial facilities are required to avoid or recycle all waste residues produced, when that is technically and economically feasible. The Waste Avoidance and Management Act explicitly states that the production of waste must be reduced as far as is technologically feasible and economically reasonable. It also introduces specific provisions to regulate products containing hazardous wastes. These provisions require product labelling and separate disposal, and restrict sale. The Federal Environmental Agency (UBA) provides financial and technical assistance to industries to develop and implement technologies that reduce hazardous waste.

The German approach to promote the development and application of environmentally sound management methods is based on the implementation of uniform technical standards for recycling, treatment, and disposal. A

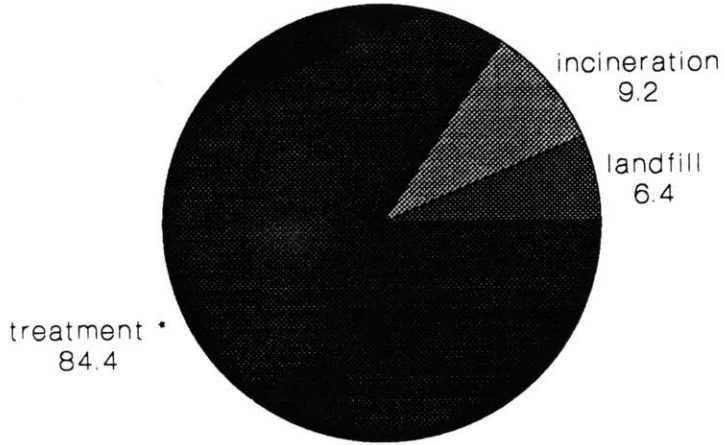
comprehensive catalog of preferred alternative technologies for managing specific waste streams has been developed at the federal level with the assistance of the UBA. Licensing of waste treatment, storage and disposal facilities is regulated by the Waste Avoidance and Management Act and the Dumping at Sea Act. The Waste Act also requires states to prepare waste management plans and it requires waste generators, transporters, and disposers to provide information to the competent authorities. It also regulates the export and import of hazardous waste.

To ensure high performance standards in managing hazardous waste, the German legislation assigns to the local authorities the responsibility to handle the waste generated in their region, by providing adequate facilities. Generators must transfer their wastes to these facilities. Two states in Germany, Bavaria and Hessen, have developed unique publicly-owned integrated systems of hazardous waste management facilities.

The impact of the regulatory system on the production of hazardous waste is illustrated by the relevant decrease in the amount of waste generated between the years 1980 and 1984 from 4 to 2.8 million tons, though an increase of 0.4 million tons can be observed between 1984 and 1987. According to data from the German Ministry for the Environment, 43.7 million tons of industrial waste (21.3% of the total) were reintroduced into commercial circulation, which represents an increase of 36.7% in comparison to earlier surveys. The proportion of hazardous waste recycled in 1987 reached 10.6% of the total hazardous waste produced (Figure 1.8).

A major barrier to implementing the comprehensive German regulatory system is the ease of exporting hazardous waste to other countries. The strict regulations and high disposal costs in West Germany have encouraged industries to transfer their waste to less regulated countries, thus undermining the effectiveness of the waste minimization policy. In 1988, West Germany exported

Figure 1.8
Hazardous Waste Management
Germany



• include recycling

Source: Federal Environmental Agency, 1988/89

1,058,067 tons of hazardous waste (39.3% of the total amount produced) to Belgium (12.1%), East Germany (64.6%), France (18.6), UK (3.4%), the Netherlands (1.1%), and Switzerland (0.2%).

In drawing up a summary of the present situation, special emphasis must be also placed on the effects that German reunification is having on the hazardous waste management problem: more than 20% of hazardous waste produced (64.6% of hazardous waste exported) goes right back into the system.

The gap between the intended and the actual implementation of the German regulatory system would seem to be determined by the costs that the stringent German standards impose on the generators. Because they apply sophisticated technology to ensure safe management, the Bavarian and Hessian treatment plants have relatively high costs, though the initial investment and most of the current financing is handled through subsidies and governmental loans. Average costs have also increased between 1984 and 1991, from 64 DM to 200 DM per ton for landfill, from 350 DM to 650 DM for incineration and from 160 to 180 MM/ton for treatment (1 DM = approximately \$.60).

However, the issue is not so simple. It would appear that high costs would motivate industry to minimize the amount of waste so as to reduce the amount of the firm's overall budget devoted to increasing waste management costs. Several studies carried out by the German Federal Environmental Agency have demonstrated the availability of technologies, the cost savings, and the possibility of immediate payback for the initial investment necessary to implement hazardous waste reduction strategies within different industrial sectors. To understand the complexity of implementing hazardous waste minimization strategies, a distinction must first be made among different types, sizes, and development phases of the industries. Smaller industries might not be able to afford the necessary initial investment. On the other hand, larger industries and multinational firms are concerned with their competitiveness on

the international market against other firms facing less stringent standards and lower costs. Furthermore, the growing business in hazardous waste management has its own interest: maximize the supply of hazardous waste to be managed. Thus it should be clear that the hazardous waste issue is a problem with different agents who each have their own interests and concerns.

To investigate the causes of implementation failure, it is necessary to analyze how these interests and concerns are taken into account in formulating objectives, selecting strategies, and drafting hazardous waste policies. In West Germany, the federal executive plays a dominant position in the overall decision-making on the environment. According to Eckard Reihbinder, there are at least three reasons for that.³⁶ The first reason is the weak position of the Parliament, especially the Bundestag (first chamber), because the executive tends to coordinate the main decisions outside of Parliament. Second, the Bundesrat (second chamber), which must be consulted on and must consent to all legislation affecting the competence of states, is composed not of elected representatives but of members of state executives. Third, proposals for new regulations are generally advanced by the executive and the Bundesrat does not usually exert effective supervision over the executive. Thus, until the emergence of the Green Party, the Parliament had only a very limited amount of control over the overall environmental decision-making by the federal executive. Also, the involvement of interest groups in the formulation of the federal regulations and administrative rules which are contemplated under the Executive Order has played a very secondary role in the Federal Executive's decision-making process.

The distribution of power between the federal government and the *Länder* is one of the most important factors affecting the German regulatory approach. At the federal level the development of regulations and national standards tends

36. Eckard Reihbinder, 1989, "The Federal Republic of Germany," in Turner T. Smith and Pascale Kromarek.

to be extremely detailed in order to maintain a strong connection with the administrative level of government based in the states. Several studies of German environmental law have pointed out that the German system is characterized by "overregulation."³⁷ At the state level, the substantial discretion provided by the German legal structure has resulted in different organizational and administrative structures for hazardous waste management across the 11 *Länder*.

The emergence of the Green Party has had a substantial impact, not only in reinforcing the control functions of the Parliament over the federal executive, but also in modifying the coalitions within the Bundesrat. The traditional coalition of conservative vs. social-democratic states collapsed into a new coalition of "polluter" (northern) states vs. "environmental" (southern) states willing to take more progressive measures.³⁸ Most important to our analysis is the impact that the emergence of the Green Party had on the overall environmental decision-making process and the increased role gained by interest groups and non-governmental-organizations (NGOs) in participating in the policy-making system.

The impact of environmental groups on policy-making is reflected in the shift of priorities in party politics in favor of the environment and in the governmental programs in favor of stringent regulatory measures. Germany, together with Denmark and the Netherlands, leads other EC countries in establishing a comprehensive regulatory system for waste management and in anticipating regulatory measures to prevent the generation of hazardous waste. Major discrepancies between the intended and actual impacts of the German hazardous waste regulations can be ascribed to the differences in regulation across national borders which allow German industries to bypass strict standards

37. Eckard Reihbinder, 1989, "The Federal Republic of Germany," in Turner T. Smith and Pascale Kromarek, *op. cit.*, [18], p. 12.

38. *Ibid.*

and transfer their waste to less regulated countries.

Italy

The Italian framework for environmental protection is established by the national government and carried out by the Ministry for the Environment, created in 1986, and by the regions. Legislative and administrative powers are distributed between the national and regional authorities. Environmental regulations and standards are enacted at the national level. The regional governments implement national regulations through the enactment of regional laws and regional plans.

The first regulatory framework for the regulation of waste in Italy is DPR 915 (Presidential Decree) of 1982, which requires producers and disposers to provide information to the competent authorities about the amounts and types of wastes generated. The Italian government enacted DPR 915 to comply with the European Directive 75/442 on waste, 76/403 on the disposal of polychlorinated biphenyl (PCB) and (PCT), and 78/319 on toxic and hazardous waste, after being condemned by the European Court of Justice, in case No. 30-34/81, for failure to adopt the measures established by the Community.

DPR 915/82 establishes specific competencies at the state, regional, provincial, and municipal levels. The national government is responsible for setting the general framework, providing technical and financial assistance, and coordinating and monitoring the implementation of the Decree. Under DPR 915, regional governments are required to develop and implement specific regional plans and to identify appropriate sites for hazardous waste management facilities, after consultation with the interested municipalities. The provinces monitor waste disposal through the Local Health Agencies (Unita' Sanitarie Locali). Municipalities carry out waste management through public and semi-public waste disposal facilities. Decree 915 regulates both municipal and

hazardous waste. Hazardous waste is considered to be any material containing a certain amount of substances as listed in an annex to the law.

Recently, the Italian government has adopted urgent provisions in the field of waste management with Law 441 (1987) and Law 475 (1988) in response to the failure of most regions to comply with Law 915. Law 441 sets specific criteria and deadlines for the development and implementation of regional plans. Law 475 establishes a five-year national plan to construct integrated hazardous waste management facilities. It assigns to the regional governments the responsibility to select appropriate sites and to create and administer these facilities. Laws 441 and 475 both emphasize that preference must be given to waste reduction and recycling.

The peculiarity of the Italian case is portrayed by the central role of planning at the national (sectoral), regional (territorial) and municipal (local) planning levels. The management of hazardous waste is regulated through the adoption of regional hazardous waste plans that must be ratified by the central government. The impact of regulation is unpredictable and uncertain due to the institutional impasse in formulating and adopting these plans. In spite of the deadline (already postponed) of July 1988, some of these plans were not drafted or approved by the regions in 1989 and none had been ratified by the Ministry for the Environment. To date, some of these plans are still not approved, while others have been rejected by the Ministry because of they are technically or economically inadequate (Table 1.10).

The impasse in implementing hazardous waste minimization strategies in Italy can be traced to the very preliminary stage of the preparation and approval of regional plans required by the national hazardous waste regulation. The data on hazardous waste production, which should be registered by now and which constitute the basis for drafting hazardous waste management plans, are still incomplete. No one what amounts of different hazardous waste are managed by

Table 1.10

Regional plans: status of approval

REGIONS	A	B	C	level	year (A/B)	year (C)
Piemonte		x	x	Council	1988	1989
Valle Aosta	x		x			1989
Lombardia	x		x	Council	1988	1989
Bolzano			x			1989
Trento			x			1989
Veneto	x			Council	1988	
Friuli V. G.	x			Government	1987	
Liguria						
Emilia R.		x	x	Government	1988	1989
Toscana	x		x	Council	1987/88	1989
Umbria		x	x	Council	1987	1989
Marche		x	x	Government	1987	1989
Lazio		x	x	Council	1986	1989
Abruzzo		x		Council	1988	
Molise		x		Council	1984	
Campania		x		Coun./Gov.	1984/86	
Puglia	x		x			1989
Basilicata	x		x			1989
Calabria	x			Government	1988	
Sicilia	x		x			1989
Sardegna	x		x	Government	1981	1989

Source: Report on the State of the Environment (Ministry for Environment, 1989).

what methods and there is no official record on the import and export of hazardous waste up to 1991.

A summary report on the implementation of DPR 915/82, produced by the Ministry for the Environment, stated:

A quantitative evaluation of the problem (of waste) is difficult because of non uniformity of criteria adopted for data collection on waste production and disposal. Thus data are not comparable. Data must be essentially considered estimates and require further inquiry.³⁹

To date, much information is still lacking. The most recent (1989) estimates provided by the Ministry for the Environment (1989) account for 17.3 million tons of municipal solid waste produced each year and 80.1 million tons of special waste of which 43.7 million tons come from industry. Of these, 3.8 million tons are classified as hazardous waste (Table 1.11).⁴⁰ Apart from the uncertainty of the estimates, there is also disagreement between the estimates provided by the Ministry, by industry, and by environmentalists. The industry estimates 50 millions tons per year of special waste of which 5 million tons are hazardous waste.⁴¹ Environmentalists do not trust either estimate, arguing that in both cases the figures are based on self-reports by generators and so far there is no verification by public agencies.

Furthermore, data on the actual management of these wastes are completely unreliable because most of the treatment and disposal facilities are

39. Extract translated from Ministero dell' Ambiente (Ministry of the Environment), "Relazione sintetica sulle problematiche concernenti lo smaltimento dei rifiuti in Italia," (DPR 915/82 e regolamento di attuazione), 14 novembre 1986. The original text reads: "La valutazione delle dimensioni del problema e' resa difficile dal fatto che i dati sulla produzione e lo smaltimento dei rifiuti urbani e speciali sono stati raccolti in modo non uniforme dalle diverse fonti e percio', nella maggior parte dei casi non sono comparabili. Tali dati hanno, dunque, essenzialmente un carattere di stima e richiedono ulteriori approfondimenti."

40. Ministero dell' Ambiente, DPCM 3/8/1990.

41. Unione delle Imprese Difesa Ambiente (UIDA), March 1989.

Table 1.11

Estimated Annual Generation Rate for Different Categories
of Solid Waste

Waste category	Annual Generation Rate (million t)
Municipal solid waste	17.3
Special waste	80.1
Vehicle waste	1.8
Construction and demolition waste	34.4
Hospital waste	0.2
Hazardous waste	3.8
Wastewater treatment sludge	3.5
Other industrial waste	33.4

Source: Italian Ministry for the Environment, 1989

not operating legally. According to a recent survey by the Ministry of the Environment, 1,893 out of 4,896 facilities surveyed do not have official permits.⁴²

As far as special wastes are concerned, the Ministry for the Environment estimates a total of 11 millions tons as the aggregated disposal capacity in facilities which comply with regulation, compared to the actual annual production of 80.1 million tons. The impact of the new legislation which came into force in 1982 and 1987 has primarily been the reduction of the waste treatment and disposal capacity which before 1982 was provided by illegal plants. Table 1.12 shows the large decrease in the number of incineration plants operating in Italy between 1973 and 1989 as a result of the more stringent regulations introduced with the new waste laws.

At present, hazardous waste management in Italy is characterized by increasing uncertainty, since there has not been an adequate response to the increased demand for waste disposal capacity due to the closure of illegal facilities. Current attempts to site new hazardous waste disposal and treatment facilities face enormous resistance from the public. The siting of those facilities is the main reason for the controversy among the parties who are affected by the regional waste management plans that must indicate facilities' sites. These controversies have slowed down the approval process for these plans and are creating enormous obstacles in the implementation process.

There are several reasons why hazardous waste regulations have had only a limited impact on the Italian system for managing hazardous waste. First, the Ministry for the Environment was established quite recently (1986), compared with those in other European countries and the organization of its functions and overall structure is still in process. Second, enforcement is not carried out as

42. Sonia Cantoni, "Che cosa sono, quanti sono, come sono fatti i rifiuti" in *L'Ecosistema Rifiuti* (a cura di E. Guazzoni), Lega per l'Ambiente, HOEPLY, 1991.

Table 1.12

Numbers and capacities of incineration plants operating
in Italy in different years

Situation	1973	1982	1989
Existing plants	125	96	40
Disposed MSW			
1000 t/year	9500	3371	2400
Percentage of total waste	16.8	24.0	13.9

Source: Bonomo and Higginson, 1988
Ministry of the Environment, 1989

provided by the environmental regulations which are extremely detailed and do not provide flexibility. Because enforcement authorities are extremely reluctant to use sanctions, the deterrent effect of these regulations is extremely limited. Third, systematic monitoring does not receive enough attention from the public administration, which is more concerned with emergency situations that must be faced in the short term.

These characteristics of the Italian system have led to the so-called "politics of emergency" which up to now has characterized the Italian environmental policy and has exacerbated the existing conflicts among the social, economic, and political actors. A relevant example of the politics of emergency in the waste management field is the set of urgent provisions adopted by the Italian government in response to the failure of regional authorities to implement regional waste plans and to site waste treatment facilities. Under emergency conditions, conflicts are exacerbated: an example is the long odyssey of two ships, *Karin B* and *Deepsea Carrier*, which returned from Nigeria carrying hazardous waste and were unloaded six months later in the port of Livorno for temporary disposal in a site in the Emilia Romagna Region.

The Netherlands

The Dutch regulatory system for environmental protection is established at the national level and is carried out by the Ministry of Housing, Physical Planning and Environment (Volkshuisvesting, Ruimtelijke Ordening en Milieu). Administrative power for environmental regulation is assigned to some extent to the provinces. The general framework for management and disposal of waste, other than radioactive waste, chemical waste and waste oil, was established by the Waste Products Act (Afvalstoffenwet) of 1977. Under the Waste Act, provinces are responsible for drawing up waste disposal plans and municipalities are responsible for their implementation. The Ministry for Environment sets the general guidelines and approves the waste plans submitted by the provinces.

The regulation of hazardous waste was established by the Chemical Waste Act (Wet Chemische Afvalstoffen) issued in 1979. Under this act hazardous wastes are: (a) all materials that contain toxic substances above specific concentration levels (all toxic components are listed in four categories of concentration levels: 50 mg/kg, 5,000 mg/kg, 20,000 mg/kg, and 50,000 mg/kg); and/or (b) all wastes that are generated by specific industrial processes listed in the law.

The measures that the Dutch laws introduced for waste prevention, waste reuse and recycling, and safe management and disposal of non recoverable waste are aimed at controlling the waste chain from raw material to waste disposal. The Chemical Waste Act provides the Dutch Ministry for Environment with the power to adopt specific rules that prohibit or restrict the manufacture and marketing of certain products. Waste avoidance and recycling are also achieved by an integrated permit system that requires industries to replace inefficient industrial processes with low-waste and no-waste technologies. The Netherlands has also adopted an economic disincentive to waste production by imposing a tax on generators of hazardous waste. The ban on land disposal of hazardous waste, established with the Chemical Waste Act (Article 31), is also aimed at encouraging waste minimization.

Strict regulations for waste management are provided through a licensing system that requires the implementation of available environmentally sound technologies. The Dutch government strongly supports the development of hazardous waste management alternatives through subsidy schemes. The Netherlands is also one of the few European countries that has established specific regulations for cleaning up hazardous waste sites.

To date, the Dutch Ministry for the Environment estimates 110 million tons as its total annual production of waste, of which 15 million tons are industrial waste and 1.1 million are chemical waste. Waste management is

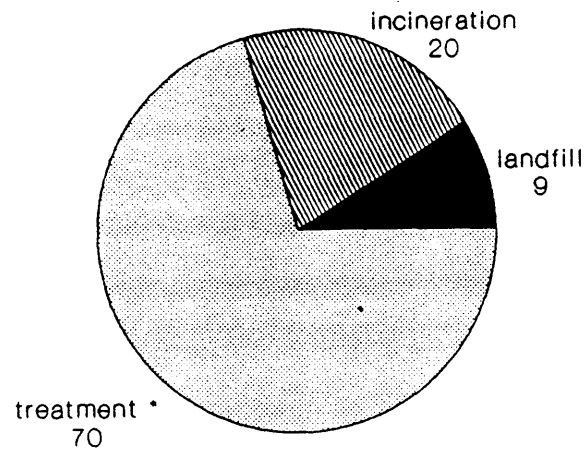
mainly carried out by treatment and reuse methods, though differences can be seen by comparing figures on the total amounts of waste, and on industrial and chemical waste (Figure 1.9). In spite of important results achieved in waste recycling, for example the recycling of 95% of coal fly ash, 85% of waste oil and 65% of sewage sludge, the total amount of waste is still increasing, while the total capacity for safe disposal and treatment has already reached saturation.

The impact of the Dutch regulations is still obstructed by several factors. The ban on land disposal of hazardous waste established by the Chemical Waste Act and the limited capacity for siting new hazardous waste facilities have increased the costs of hazardous waste management facilities and therefore encouraged waste minimization. However, the major factors affecting the actual implementation of the Dutch policy are the cheaper options provided by the national and cross-national loopholes in the regulation of hazardous waste. A major gap in the national regulation is the possibility for industries to manage hazardous waste at the site where they are generated, without a license. A second option for industries to escape control is provided by the differences in national regulations that encourage the export of hazardous waste to less regulated countries. The OECD estimates that 189,000 tons of hazardous waste (13% of national total production) are exported from the Netherlands each year.

In a study on waste management carried out in 1988, the Ministry for the Environment observed the insufficient results of the waste policy and emphasized the priority of waste prevention and reuse, highlighting the large margin of recycling achievable in the short, medium and long terms. The National Environmental Policy Plan (NEPP, 1989) provides specific targets up until the year 2000 and a new source-oriented strategy for waste policy, as part of an integrated approach to environmental problems. The plan identifies 29 priority waste streams selected out of a list of 78 on a systematic ranking system that includes environmental, health, technical, and economic factors. It also sets specific reduction and recycling targets and indicates possible measures to

Figure 1.9

Hazardous Waste Management
The Netherlands 1986 (%)



• Include recycling

Source: Based on Data Provided by the Dutch Ministry of the Environment

achieve these targets. The overall target for the 29 selected waste streams is to eliminate 5% of the total amount of waste by the year 2000, reducing the percentage of waste reaching the final stage (incineration and landfill) from 65% to 35%, and decreasing the amount of waste being landfilled from 55% to 10% (Figure 1.10). Specific guidelines are provided for each specific waste stream (Figures 1.11, 1.12, 1.13).

One of the most important aspects of the new policy is the setting and achieving of the proposed targets. As stated in the plan, the guidelines for the waste streams are a starting point for "strategic discussions" among the parties involved with a particular waste stream. According to the Dutch Ministry for the Environment, to implement this plan, a joint effort of all parties is necessary.⁴³ Implementation plans for priority waste flows are being drawn up jointly with the industry and other governmental agencies according to the Memorandum on Waste Prevention.⁴⁴ As established by the National Environmental Policy Plan, waste reduction plans will have to be in force in 1994.⁴⁵

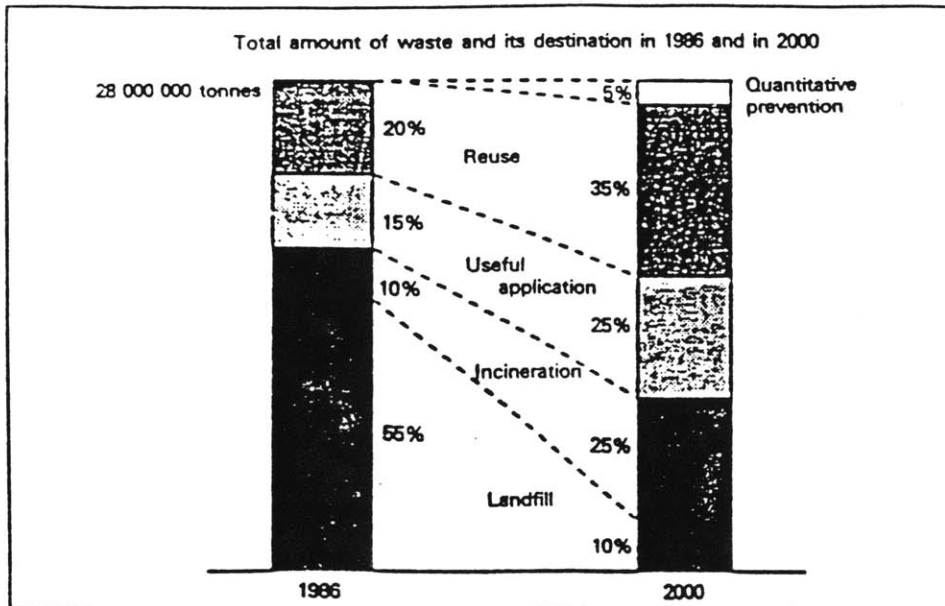
The new Dutch policy on waste streams is the response of the Dutch government to the limited impact of regulations in minimizing hazardous waste. One of the most important shifts in the evolution of Dutch environmental policy has been the attention to implementation problems in the process of designing environmental regulations and plans. This has been pursued by involving target

43. M.M.J. Allesie, Ministry of Housing, Physical Planning and Environment, "An Approach to the Prevention and Recycling of Waste," in UNEP *Industry and Environment* January/February/March 1989, pp. 25-29.

44. Dutch Second Chamber of the States General, 1988/89, *Memorandum on Waste Prevention*, 20 877, No. 2.

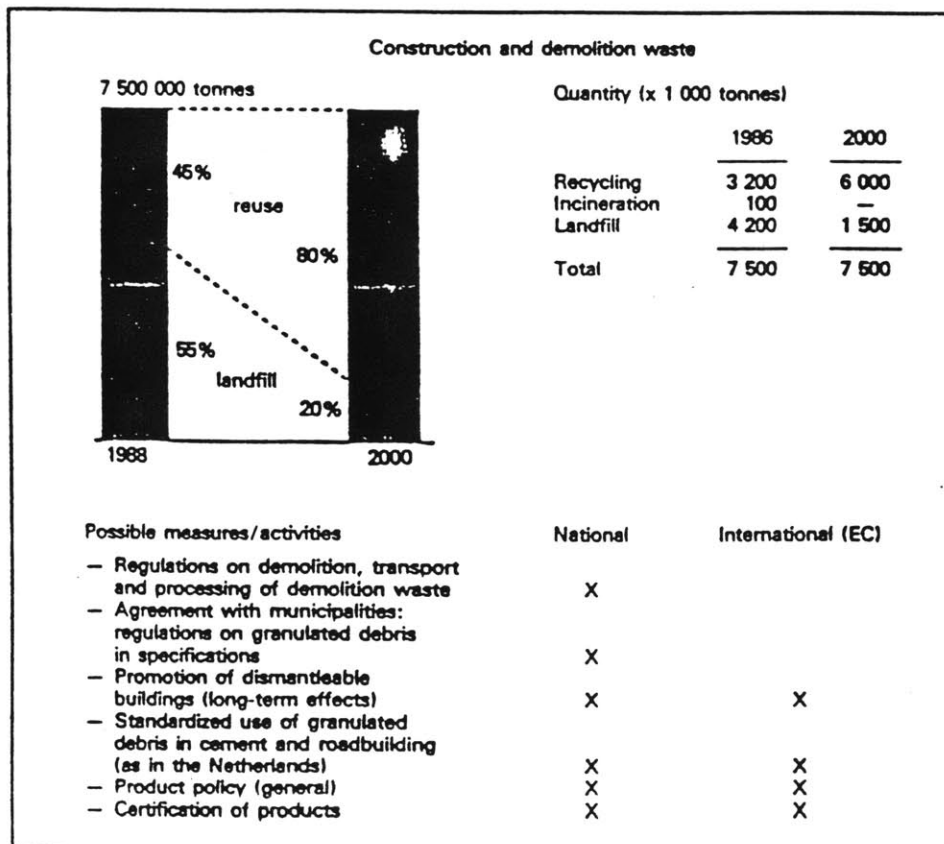
45. Dutch Second Chamber of the State General, 1988/89. *National Environmental Policy Plan: To Choose or to Lose*. The Netherlands. Section 6.2.5 (A66), p. 148; and Section 7.4, p. 207. The principal waste streams involved are: used oil, car tires, car wrecks, batteries, iron in domestic waste, phosphoric acid gypsum, glass (single use), waste substances containing halogenated hydrocarbons, jarosite, plastic waste, waste paper and cardboard, oxylime sludge, shredder waste, slag and fly ash from incineration of industrial waste, spray paint waste, blasting sand, and wastes from packaging.

Figure 1.10



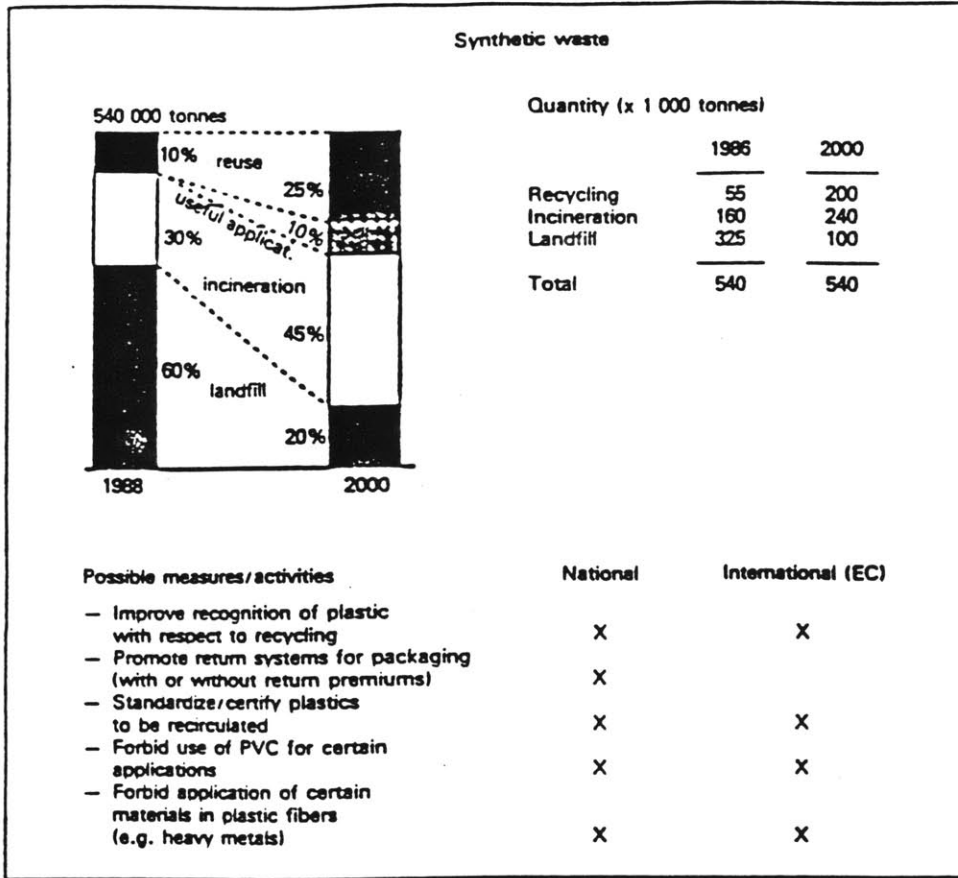
Source: VROM, 1988

Figure 1.11



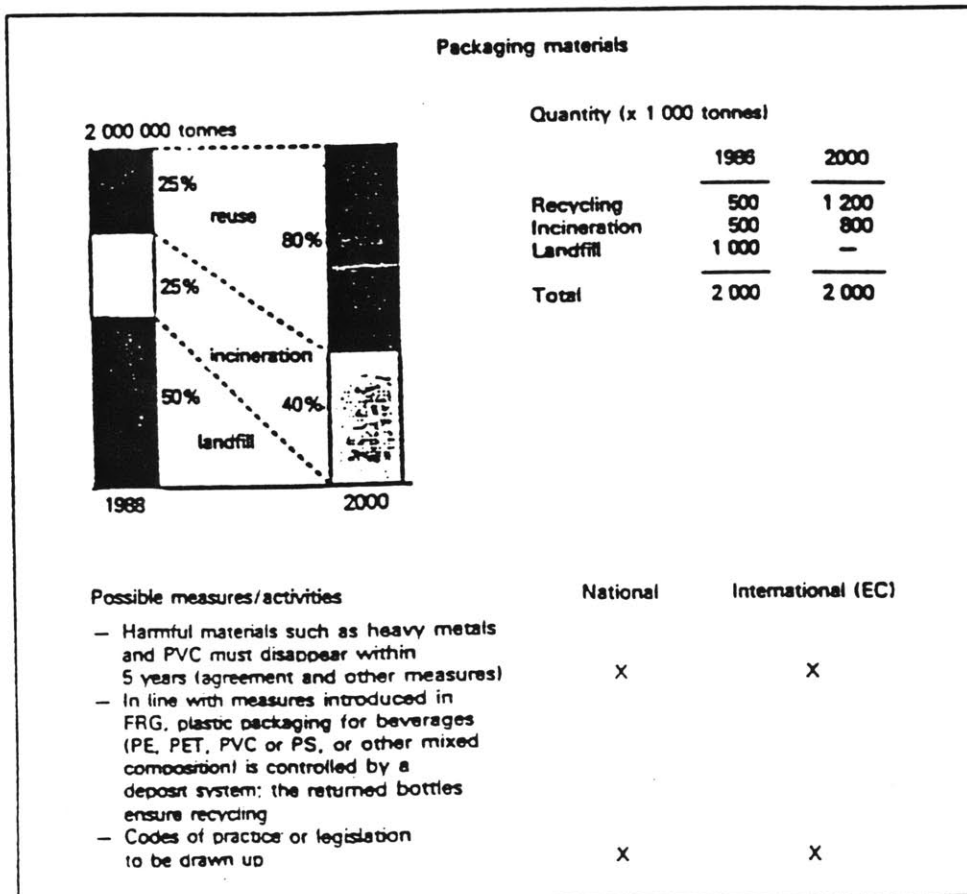
Source: VROM, 1988.

Figure 1.12



Source: VROM, 1988.

Figure 1.13



groups in the policy-making process. In the Netherlands, interest groups have access to rule-making and they have formal recognition on governmental advisory committees. In addition, the Dutch government has appointed a Committee on Industry and the Environment to promote joint government-industry research and development projects for clean technologies.

United Kingdom

In the United Kingdom (UK), legislative power is concentrated in the central government, while responsibilities for implementation and enforcement rest with local authorities. The UK approach to environmental protection differs from those in the other European countries in the enormous discretion it leaves to local authorities to interpret and implement environmental standards and regulation. Environmental policy in the UK also differs in its emphasis on end-point pollution control strategies more than on prevention.

Before the new Environmental Protection Act of November 1990 come into force, the management of hazardous wastes was regulated by the Control of Pollution Act (1974). As defined under this act, hazardous waste contains a substance listed in the regulation and has a flashpoint of 21 degrees Celsius or less, or is dangerous to life. According to the same act, a waste is dangerous to life if a single dose of not more than 5 cm³ would be likely to cause death or serious damage to tissue if ingested by a child of 20kg. body weight, or if exposure to it for 15 minutes or less would be likely to cause serious damage to human tissue by inhalation, skin contact, or eye contact.

The two relevant provisions introduced with the Control of Pollution Act are a licensing system for hazardous waste management facilities and a manifesting system for controlling waste transfer. No specific provisions are defined for waste reduction, recycling, and reuse. Other European countries have promoted waste reduction by increasing the costs of landfill and waste

treatment. In UK the low cost of landfill has raised the amount of hazardous waste disposed of onto or into land.

As a result, the amount of waste produced each year has reached 67.7 million tons in 1988, of which 50 million tons is industrial waste and 4.5 is hazardous waste.⁴⁶ A large part of these wastes are disposed of in landfills: 88% of the total amount of waste and 70% of the hazardous waste (Figure 1.14). It is also important to note the relevant role of the private sector in waste disposal in the UK. Only 27.4 million tons of waste are disposed of in municipal facilities, while the rest is disposed of by private contractors. Of those, 38.2 million tons are industrial wastes, 1.6 million tons are special wastes, and 2.4 million tons other hazardous wastes (Table 1.13).

Another relevant effect of the UK's regulatory flexibility and the comparatively low cost of waste disposal is the enormous increase in waste import that occurred between 1981 and 1987 (Figure 1.15). This trend for the UK to import wastes corresponds unequivocally to the increased measures for controlling hazardous waste that have been introduced in other European countries.

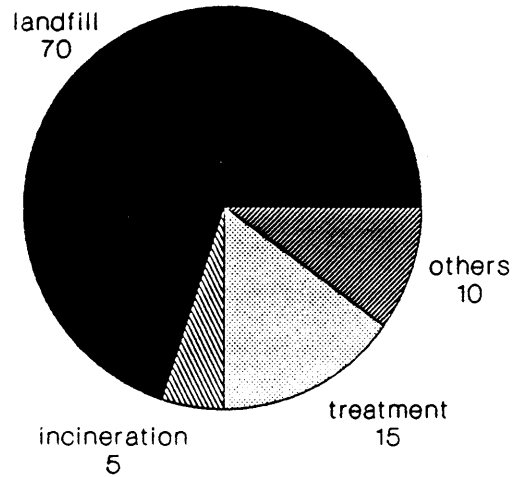
In portraying the UK's environmental regulatory system, several authors have pointed out its uniquely discretionary character. According to Richard Macrory, "discretion and practicability are the key attributes that over a lengthy period of time have characterized the design and application of British environmental law and policy."⁴⁷

46. Note that the UK definition of "special waste" includes only a portion of the hazardous wastes. Special wastes are estimated at 1.6 million tons.

47. Richard Macrory, "The United Kingdom," in Turner T. Smith and Pascale Kromarek, 1989, *op. cit.*, p. 31. See also Eryl Madel and Brian Wynne, "Decentralized Regulation and Technical Discretion: The UK" in Wynne, *op. cit.*, pp: 195-244, and David Vogel *National Styles of Regulation*, Cornell University Press, Ithaca, 1986.

Figure 1.14

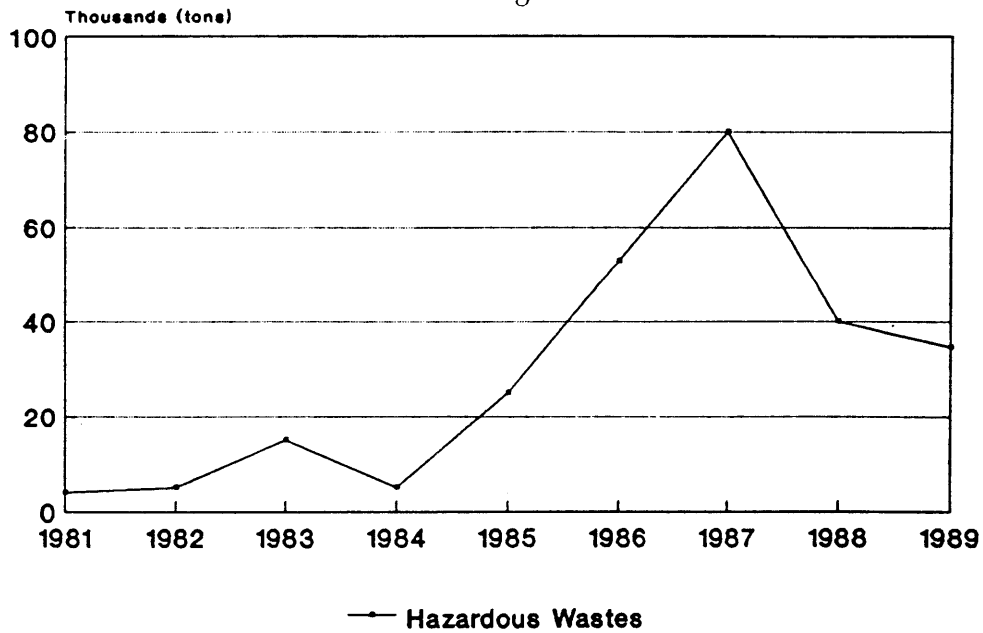
Hazardous Waste Management
United Kingdom 1990 (%)



Source: UK Department of the Environment

Figure 1.15

Hazardous Waste Import
United Kingdom



Source: Department of the Environment, UK, 1991

Table 1.13

The Principal Waste Streams in the UK
(million tons per year)

Collection	WDA disposal		
	WDA sites	Private sites	Private sector disposal
Collection authorities (18.0)	13.1	4.9	
Domestic (16.6)			
Commerce (1.4)			
Civic amenity wastes (4.7)	4.7		
Industry and commerce			
Commercial (7.8)	7.8		
Special wastes (1.6)			1.6
Other hazardous (2.4)			2.4
General industrial (38.2)			38.2
Inert wastes (15.0)	1.8		13.2
Inert wastes, in home use (10.0)			

Note: Excluding mining, agricultural and power station wastes.

Source: Higginson, 1988

The UK's regulatory system for hazardous waste management has so far been characterized by extreme decentralization of authority. While a regulatory framework is defined at the central level of government, responsibility for implementation of the Control of Pollution Act is assigned to 165 local waste disposal authorities. Only recently a centralized Hazardous Waste Inspectorate has been established within Her Majesty's Pollution Inspectorate (HMPI) which is part of the national Department of the Environment. The Hazardous Waste Inspectorate is meant to supervise the compliance of local authorities with the national regulatory scheme and to reduce the differences in standards across different counties.

The new Environmental Protection Act of 1990 introduces substantial changes in the old Control Pollution Act. Part I establishes a new regime of Integrated Pollution Control (IPC) covering all emissions to air, land, and water for prescribed industrial processes. The IPC implies authorization from the HMIP subject to the adoption of the Best Available Technology not Entailing Excessive Cost (BATNEEC) to prevent or minimize releases of prescribed substances. Part II of the Act, which deals specifically with waste management, introduces a more stringent licensing and registration procedure and prohibits deposit, treatment, and disposal of waste under a waste management license. A duty of care is also introduced for anyone who imports, produces, carries, keeps, treats, or disposes of controlled waste. Furthermore, under Part VIII of the Act, the Secretary of State may by regulation prohibit or restrict the import or export of waste and the import, use, supply, and storage of specified substances or products in order to prevent pollution or harm to human health.

The new Environmental Protection Act and the establishment of a national environmental agency represent a substantial change in the UK's regulatory style in response to the increased pressure of environmental problems. The need for increased coordination across local agencies and for the integration of different aspects of environmental pollution control are leading the central government to

take on an increased level of responsibility for environmental matters. According to Richard Macrory, there are at least three forces for this trend. The first is a legal reason arising out of the task of negotiating EC environmental policies and the legal obligation to secure implementation. The second reason concerns the voting patterns in national elections and the consciousness of a "green vote." The third reason concerns the increasing consciousness of policy-makers that they need to monitor the implementation: it is becoming obvious that the practice can be as crucial as the design of the control measures.⁴⁸

1.3 Comparative analysis of management approaches

Marked differences can be observed in the technical definitions, standards, and regulatory approaches across West Germany, Italy, the Netherlands and the UK. Tables 1.14 and 1.15 summarize the requirements of each regulatory system. Five important differences emerge: (1) the formal vs. informal approach to hazardous waste regulation; (2) the degree of centralization and power separation of institutional arrangements; (3) the monopoly vs. market-oriented approach to waste management; (4) the degree of public access to information and rulemaking; and (5) the handling of scientific controversy in policy making.

Formal vs. informal approaches to regulation

Regulatory schemes for hazardous waste management in Europe rely on standards, licensing and manifest systems, planning, economic incentives, and monitoring. West Germany, Italy, the Netherlands and the UK apply a combination of these measures, though with different emphases. In the Netherlands, the integrated permitting system is the most important instrument

48. Richard Macrory, "The United Kingdom," in Turner T. Smith and Pascale Kromarek, 1989, op. cit., p. 43.

Table 1.14

NATIONAL CONTROL SYSTEMS

REQUIREMENTS FOR GENERATORS	GERMANY	ITALY	UK	NETHERLANDS
1. Ban on generation of certain waste				yes
2. Required recycling		yes		yes
3. Disposal permits	yes	yes	yes	yes
4. Registration of waste	yes	yes	yes	
5. Reporting of waste	yes	yes		yes
6. Mandatory transfer to specified facilities	yes			
7. Supervised transport and disposal	yes			yes

REQUIREMENTS FOR TRANSPORTERS	GERMANY	ITALY	UK	NETHERLANDS
1. Licensing	yes	yes		
2. Manifest Systems	yes	yes	yes	yes
3. Export/Import	yes	yes	yes	yes
4. Register	yes	yes	yes	
5. Notification	yes	yes	yes	
6. Insurance	yes			

Table 1.15

NATIONAL CONTROL SYSTEMS

REQUIREMENTS FOR DISPOSERS	GERMANY	ITALY	UK	NETHERLANDS
1. Licensing	yes	yes	yes	yes
2. Register	yes	yes	yes	yes
3. Reporting	yes	yes	yes	
4. Required treatment of specified waste streams	yes			yes
5. Closure obligations	yes			yes

70

RESPONSIBILITIES	GERMANY	ITALY	UK	NETHERLANDS
1. Regulatory authorities	Federal	National	National	National
2. Enforcement	State	National	Local	National
3. Planning	State	Regional	Local	Provincial
4. Monitoring	Federal	National	National	National

for controlling hazardous waste, whereas West Germany relies primarily on a unified system of standards. In the UK, hazardous waste is primarily regulated by a system of case-by-case licensing and manifesting. In Italy, hazardous waste management is based on regional hazardous waste plans.

A major difference across these countries is in the philosophies for rule-making and regulations. Although the Netherlands and West Germany place different emphases on the measures to control hazardous waste, they rely on precise and inflexible standards and formal enforcement procedures. The origin of this formal approach in both systems arises from the attempt of central bodies to control local regulatory bodies. The UK's system contrasts strikingly with the Dutch and German systems in its discretionary and informal regulatory approach and its reliance on voluntary compliance by industry. Recently, the UK has been entering a new period signified by increased use of formal rules. However, the UK's approach to regulation has been characterized by its informal trust among institutional actors and collaboration between government and industry. The Italian case is peculiar in that flexibility is not built into the regulatory framework, as it is in the UK. Instead, flexibility is part of a "non-compliant" institutional system.

The impact of stringent standards for the management of hazardous waste in West Germany and the Netherlands is demonstrated by the shift from landfill to treatment of hazardous waste. The presence of formal rules alone, however, is not a good indicator of the extent to which countries have achieved their regulatory objectives. Although they have adopted different regulatory approaches, similar difficulties arising from the implementation of hazardous waste management systems can be analyzed in all four countries. This is demonstrated by the current state of illegality of almost half of the operating facilities in Italy where hazardous waste management regulations entered into force in 1982. In the Netherlands, West Germany and Italy, industries escape control by a common pattern of waste exports to less regulated countries.

Centralized vs. decentralized systems

Differences in the degree of centralization (the Netherlands and Italy) versus decentralization (West Germany and the United Kingdom); and in the separation (West Germany) versus integration (the Netherlands and Italy) of regulatory authority from the implementation authority significantly affect the way in which hazardous waste management is carried out in the four selected countries. In West Germany, statutory goals are set at the federal level but implementation of environmental regulation is the responsibility of the *Länder* which have substantial discretion in choosing how the statutory goals will be met. Greater decentralization can be observed in the United Kingdom, which allocates regulatory responsibilities to more than 200 waste disposal authorities. However, while the UK's central government gives the local authorities ample discretion in interpreting hazardous waste standards and regulatory criteria, the German Federal Government seeks control over states via a unified standard system and formal criteria. The strong German emphasis on strict and unified standards for pollution prevention stems from its federal structure and from the institutional need to maintain communication between policy making and implementation which are split between the federal and state levels.⁴⁹

In principle, the decentralizing responsibility for hazardous waste management should be an appropriate response to the heterogeneity of hazardous waste problems across different regions and to preference for managing hazardous wastes close to source. However, the institutional fragmentation of hazardous waste control across different authorities and levels of government runs counter to the opportunities for controlling the waste life cycle and minimizing hazardous waste. The lack of uniform standards across the various UK counties, a result of the high decentralization of authority for the

49. Graham Bennet and Konrad von Molke, "Integrated Permitting in the Netherlands and the Federal Republic of Germany," Chapter 6 in N. Haigh and F. Irwin (editors) *Integrated Pollution Control*. The Conservation Foundation, 1990, p. 121.

management of hazardous waste, can be blamed for the limited success of the UK hazardous waste policies. In Germany, the extensive movement of hazardous waste across German states, resulting from varying levels of stringency in standards, affects the success of each single state in implementing its hazardous waste management system.

Public monopoly vs. markets

The choice of public versus private ownership and control of waste management facilities is critical. Two German states, Bavaria and Hessen, have developed successful systems of public financing and ownership of integrated hazardous waste management facilities which are equipped with the most up-to-date and environmentally sound technologies. In the United Kingdom, in contrast, the management of hazardous waste is nearly 98% in the hands of private industry and regulated by local authorities through site licensing, inspection, and legal enforcement. In Italy and the Netherlands hazardous waste management facilities may be either private or public.

In West Germany, the public monopoly over hazardous waste management is intended to secure high performance standards and environmental protection in managing hazardous waste. The states of Bavaria and Hessen have chosen to rely on public or semi-public hazardous waste facilities because they question the ability of the private market to assure stable and long-term environmentally safe management of hazardous waste. However, the failure to create a mixed public and private system in another German state (North Rhine-Westfalia) shows that public facilities cannot exist without measures that protect them from competitive options, whether in-state or out-of-state.⁵⁰ Yet, the failure of public enterprises in the Netherlands and Italy

50. The North Rhine-Westfalia case is compared to the Bavaria and Hesse cases in B. Wynne, *Risk Management and Hazardous Waste*, Springer-Verlag, 1987. In the Ruhr region of North Rhine-Westfalia, the more expansive public hazardous waste incinerator located at Herten

indicates that public ownership does not always ensure safe management. In most cases, compared with private hazardous waste facilities, public facilities are less efficient and rarely supervised. On the other hand, when left to the private market, the management of hazardous waste is driven by the prices of available options, regardless of the environmental priorities. In UK, where the management of hazardous waste is in the hands of the private sector, the landfills continue to be the most popular option because of the low price of land disposal.

Public information and participation

Different institutional styles can be observed by examining the participation of political, economic, and social actors in policy making and policy implementation. In this respect, the Dutch case differs from the others in its participatory system. In Germany as well as in the UK, decision-making by central authorities is not subject to public review. In both Germany and the UK, legitimation of regulation is part of a similar authoritative institutional framework, which contrasts with the more open Dutch system. In the UK as well as in West Germany, varying forms of consultation with interest groups take place before regulations are enacted. However, while the UK system of authority is hierarchic and monolithic, the autonomy of individual states in Germany leads to some sort of control over the central authority. Furthermore, even if Germany and the UK have no form of public participation in rule-making, their different regulatory approaches lead to contrasting results. In the UK the flexible character of the regulatory system, combined with limited public access to rule-making, undermines public control and leaves ample discretion to policy makers. The

could not compete with less technologically advanced alternatives offered by the private market and by other states. Wynne points out that the crucial difference between the Herten case and the Bavaria and Hesse cases is the lack of compulsory use and export restrictions. The states of Bavaria and Hesse have established compulsory use of public and semi-public facilities and restricted exports in order to avoid competition with cheaper hazardous waste disposal alternatives.

highly formal German regulatory style, combined with a uniform system of strict standards, does not leave much discretion to the state in interpreting the rules. Instead discretion is left to the state in deciding how to implement the rules.

In contrast, the Netherlands, which uses precise and inflexible technical standards, provides access to rule-making for public interest groups which have formal recognition on government advisory committees. More important is the emphasis posed by the Dutch Ministry of the Environment on cooperation strategies and dispute resolution among interest groups as part of its hazardous waste policy. Moreover, the role of the public in setting up environmental measures is gaining importance as the benefits of reaching agreements among interest groups are becoming clear. In Italy, the formal access of interest groups in governmental decision-making which has occurred, for example, with the creation of the National Council for the Environment has not corresponded to an improved capacity of governmental agencies to settle environmental disputes.

Thus, the degree to which interest groups participate in rule-making, taken alone, is not a meaningful indicator of a country's chances of implementing hazardous waste policies. Instead, a more meaningful indicator is the degree of consensus that participation mechanisms allow the various parties to achieve on the measures that will be adopted. As I will show later, the participation of interest groups in setting hazardous waste regulatory measures is essential to implementation when linked with the capacity of public agencies to face the conflicts in the policy-making process.

Handling scientific controversy

Scientific controversy surrounds the classification of the chemical constituents of waste and their concentration levels. There is great uncertainty about the toxicity of substances, their fate, and dose-response relationships. The way scientific disputes regarding the risk to human health and the environment

posed by these substances are handled in the policy-making process is relevant because of the conflicts that such uncertainty generates. The Netherlands and West Germany use a formal risk-analysis approach. However, while in the Netherlands the assessment process is open to the participation of all the actors involved and scientific controversy is handled by negotiation, in Germany the assessment of risk is carried out by specific scientific committees designated by the federal and state authorities. In Germany, Italy and the UK, risk assessment of hazardous substances is not subjected to public review. In these countries informal consultations with interested parties are held after risk assessments are carried out by scientific committees but before regulations are issued. In Germany the standardization of hazardous waste regulations is pursued via uniformly strict standards established at the federal level. In Italy standardization is pursued via national standards that must be implemented by the regions. In the UK, however, where the definition of hazardous waste is based on testing procedures, the lack of transparency in the risk assessment process has produced divergent levels of control and increased public concern.

The different approaches adopted by public agencies in handling scientific uncertainty reflect the differing role of science in policy decision in each national context. Moreover they show that scientific knowledge is not context free. Its impact on policy making depends on its practical interpretation and application, which in turn reflect different institutional assumptions.

In this chapter I have examined the origins of national policy differences between West Germany, Italy, the Netherlands, and the UK. My next step is to search for similar patterns of implementation across these different institutional settings and different regulatory schemes.

CHAPTER 2
OBSTACLES TO IMPLEMENTATION: FOUR CASE STUDIES
OF WASTE MINIMIZATION

Hazardous waste policies in Western Europe place a high priority on the minimization of hazardous waste. These policies, which are aimed at preventing the health and environmental effects of improper waste management, establish a hierarchy of hazardous waste options: avoidance of hazardous waste at the source is preferred to reuse and recycling, which in turn is preferred to treatment of hazardous waste. Disposal on land and at sea is the least preferred option. To implement this hierarchy, European public agencies have adopted several regulatory and non-regulatory measures meant to influence industrial decision-makers in their choices of product design, raw materials and production processes, as well as in making decisions about the management of their hazardous by-products.

Current trends towards the increasing production of hazardous waste in European countries show, however, that these measures have not had led industry to choose to avoid generating hazardous waste. Similar implementation patterns of hazardous waste minimization policies emerge in Germany, Italy, the Netherlands and the UK. These countries have all failed to achieve minimization of hazardous waste, despite striking differences in how each country has pursued this goal.

This chapter examines which institutional, economic, social and technical factors can best explain the patterns of hazardous waste policy implementation in Germany, Italy, the UK, and the Netherlands. In particular, I analyze the success of the recent Dutch efforts in setting minimization targets for priority waste streams and drafting implementation plans, in order to illuminate the nature of the obstacles to implementation.

2.1 Patterns of hazardous waste minimization in four European countries

All the European countries have opted to promote hazardous waste minimization by raising hazardous waste management standards and by providing incentives, as opposed to adopting regulatory measures that prescribe waste minimization. We can, however, find significant differences across countries if we analyze the ways that the various national governments pursue this goal. Germany and the Netherlands have adopted comprehensive hazardous waste management systems and rely on national uniform standards which are implemented by local authorities. The Italian law establishes regional plans which must be drafted and implemented by regional governments in compliance with national standards. The UK has, up to now, given great latitude to local hazardous waste authorities to choose which means will best meet the objectives of the national hazardous waste regulatory framework.

The emphasis that varying national regulatory schemes place on one or another of these approaches is linked to their need to satisfy different social and economic relationships within their particular national context. Moreover, the stringency of regulations reflects different national conflicts and tradeoffs across European countries.

As a result of these different approaches, we can see varying outcomes across European countries if we analyze the predominant practices of hazardous waste management. Germany and the Netherlands, which have both adopted strict hazardous waste management regulations, have shifted from land disposal and incineration at sea to incineration on land, plus treatment and recycling. In contrast, in the UK, where regulations are more flexible, and in Italy where non-compliance with regulation is the rule, land disposal of hazardous waste is still the most common practice of waste management.

Despite different levels of regulation across the European countries, the trend towards rising levels of hazardous waste production in all of these countries reveals that hazardous waste policies have not led industry to choose to minimize hazardous waste. Similar difficulties in implementing hazardous waste minimization strategies can be found across all these countries. Standards and regulations have increased disposal costs, but left industries the cheaper option of exporting their hazardous waste to less regulated countries. Moreover, after having introduced regulatory control systems and strict requirements for proper hazardous waste management, most European countries have encountered enormous difficulties in providing the waste generators with sufficient technical and practical options to treat their waste as required by law.

National case studies

To carry out my inquiry into the difficulties of implementing minimization strategies, I have examined four countries in which governmental agencies have successfully implemented or failed to implement waste reduction strategies: Germany, Italy, the Netherlands and the UK. I took each country as a separate case and examined several institutional, social, economic, and technical factors in order to identify which of them best explain the patterns of implementation within each national context. My inquiry was based on my review of official records provided by the national public agencies, plus previous studies on hazardous waste policies in these countries, and on direct interviews with public officials, industrial representatives, and leaders of environmental organizations involved in each case of waste minimization. Additional data that I have considered were provided by local public agencies, private companies, and non-governmental organizations. Several examples in each national context illustrate key points of my analysis.

In Germany, I analyzed the implementation of the uniform technical

standard system on the basis of which the German Federal Environmental Agency (UBA) requires industries to adopt, where available, specific waste minimization technologies. In Italy, my analysis focused on the process of formulating, approving and implementing regional plans for hazardous waste management. In the Netherlands, I analyzed the recent Dutch policy on priority waste streams and the process of setting minimization targets throughout negotiation tables. In the UK, I analyzed the implementation of hazardous waste minimization through decentralized authorities which are in charge of setting the measures aimed at putting into force the UK hazardous waste regulatory framework.

Obstacles to implementation

To understand the nature and extent of the obstacles the national governments encountered in implementing hazardous waste minimization strategies, several economic, institutional, social, and political variables should be considered.

Tractability of hazardous waste issues. Several features inherent in hazardous waste issues affect the ability of government agencies to achieve their objectives for hazardous waste minimization. One is the very heterogeneity of the waste types, environmental and health risks, waste generators, and management options involved. Another important factor is the enormous uncertainty which characterizes the waste life-cycle from source to final disposal. This uncertainty is especially emphasized by the movement of hazardous wastes across national boundaries which may change their regulatory status. Yet another important factor is the enormous uncertainty and controversy around the threats that hazardous substances pose to public health and the environment. The technical difficulties, the range and the diversity of target groups, and the extent of behavioral change required to minimize hazardous waste make hazardous waste issues very complex.

Regulatory approaches. Implementation patterns across Germany, the Netherlands, Italy, and the UK can also be analyzed by examining the different regulatory philosophies as well as the stringency of standards. The likelihood of controlling the complex hazardous waste life-cycle and encouraging substantial behavioral changes across the wide and heterogeneous range of target groups is in fact a function of several institutional factors. Thus, the extent to which different European countries have been successful in enhancing hazardous waste minimization can be analyzed by focusing on the regulatory approach chosen, the comprehensiveness and stringency of the regulations, and the standard-versus economic-based instruments adopted, as well as the way that the national governments allocate various responsibilities to different levels of authority and establish cooperation and coordination procedures across regulatory bodies and implementation agencies.

Particularly important for this analysis is the way that European regulations structure the process of implementing hazardous waste policies which might explain different outcomes across countries. Given the highly controversial nature of hazardous waste issues, important variables to be considered are the public access to rule-making and the ways public agencies handle the conflicts among interest groups in the policy-making process.

Economic variables. Economic factors play a primary role in industrial decision-making. Differences in the costs of landfills, incineration and treatment of hazardous waste across EC countries are reflected in the predominant practices for managing such waste in these countries. Thus, increasing costs of waste treatment and disposal imposed by higher environmental standards are expected to have an important influence on the industry's choice to reduce its hazardous residuals. On the other hand, the high capital costs of changing production processes in order to avoid the generation of such waste may still outweigh the costs of available options for

waste disposal. Furthermore, exporting hazardous waste to less regulated countries is still a cheaper option left to industry by current regulations, which undermines the expected effect of such increased costs on minimizing hazardous waste.

Socio-political variables. Variations in the degree of commitment and effort of the various European public agencies in searching for environmentally sound alternatives for waste management can be correlated to the varying criticality of hazardous waste issues and to variations in perception across national contexts. Thus, different social and economic conditions among nations are likely to affect the implementation of hazardous waste policies because the degree of national efforts are a function of the available national resources, the seriousness of hazardous waste issues in each national context and the national tradeoffs between economic and environmental priorities.

The interests and conflicts among the actors involved in the policy-making process play a crucial role in making these tradeoffs. The implementation patterns can be analyzed by focusing on the conflicts and tradeoffs which emerge in each national context. Conflicts exist among interest groups on the priority of economic versus environmental considerations in setting regulatory objectives. Conflicts also exist in balancing economic costs against environmental risks and in allocating the costs of proper hazardous waste management.

Institutional variables. Policy analysts have made numerous attempts to identify the relationships between policy formulation and implementation. Bardach (1977) and Berman and McLaughlin (1976) emphasize the adjustments that take place between goals and strategies among the actors involved throughout the implementation process. Majone and Wildavsky (1978) suggest that policies are continuously transformed as implementers act to adjust

policy objectives in response to constraints and changing circumstances. Wynne (1987), referring to hazardous waste policies, contends that policy analysis has tended to focus on policy decisions as definitive events rather than to examine their relationships with practical outcomes. Thus, policy analysts treat implementation as downstream decision enactment and attribute implementation failure to inadequate technical knowledge. Instead, Wynne argues, implementation problems are due to inadequate institutional mechanisms to put into effective use this knowledge, in the context of the conflicting organizational constraints, interests and realities which are generally excluded from policy making. The relationship between policy implementation and policy formulation, as outlined by these researchers, proved to be relevant to this research.

I have assumed that all these factors have important consequences for the implementation of hazardous waste minimization policies. The aim of my inquiry was to explore to what extent and under which conditions these different factors inhibit or enhance hazardous waste minimization.

Four patterns of implementation

I began my analysis by examining the problems of implementing hazardous waste policies within each national context. There are three principal areas where gaps in regulations arose: control of a given firm's in-house treatment and disposal facilities and temporary storage of hazardous waste; control of wastes destined for recycling; and export of hazardous waste. As a result of these regulatory gaps, public agencies have failed to achieve control of waste management and to implement minimization targets.

I observed similar outcomes across different institutional settings and regulatory schemes and searched for patterns of policy implementation that could explain these outcomes. My case studies show that tighter standards

and increased waste disposal, together with loopholes in regulations, have resulted in the increasing export of hazardous waste to less regulated countries, thus thwarting waste minimization efforts.

Loopholes in regulations, which allow industries to escape controls, reflect the conflicts among the interests involved in implementing measures aimed at minimizing hazardous waste. Industry opposes tight standards because of the additional costs which they impose on the management of their hazardous residuals. On the other hand, increased public concern regarding the risk that hazardous waste may pose puts pressure on national governments to adopt more stringent regulations. Governments must respond to public concerns without weakening their economic position.

Thus, the difficulties in implementing strategies aimed at minimizing hazardous waste can be seen to be clearly correlated with the emergence of conflicts among the social, political, and economic actors on the measures to be adopted to achieve the minimization of hazardous waste. These conflicts are not resolved in the process of establishing regulatory measures. Once regulations are enacted, they simply re-emerge during implementation, impeding the achievement of established objectives. The responses of target groups which oppose regulations and are not directly involved in policy-making range from non-compliance to explicit obstruction.

The different ways that policy-makers handle these conflicts in the policy-making process are critical in understanding these implementation patterns. Also, the ways institutions structure the relationships between policy formulation and implementation proved to have important consequences on the policy outcomes. These variables help to explain similar outcomes among countries such as the Germany, UK and Italy that have adopted quite different regulatory approaches. They also explain different outcomes among countries such as the Netherlands and Germany, which have adopted similar

regulatory frameworks and rely on the same level of stringency of regulations.

Except for the new Dutch policy that involves the parties in conflict in setting implementation plans, in all the other countries the policy-making process was closed. Important interest groups were excluded from the decision on which strategy to adopt. In addition, these countries, not only kept separate the stages of policy formulation and implementation, but also divide the powers among separate authorities and levels of government. Four different patterns can be analyzed within and across these national contexts depending on their different institutional settings.

The first pattern of implementation arises as a result of the strict distinction between policy formulation and implementation in the allocation of competence to different authorities. This distinction is emphasized by those institutional settings, such as the German federal system, which allocate different legislative and administrative powers to different levels of government. In this context, the implementation of hazardous waste regulation is treated as a downstream enactment of decisions established at the central level without involving the target groups. When conflicts of interests that are not resolved in the policy-making process, they likely re-emerge in the implementation process in the form of non-compliance with regulations. Once regulations are enacted, then it is often too late to resolve these conflicts. Although implementation authorities in Germany are left with ample latitude to set the measures for complying with regulatory objectives, the enactment of regulations leaves little room for these authorities to effectively cooperate with target groups.

A second pattern of implementation is the shift in policy objectives that takes place through the policy implementation process in decentralized and discretionary systems such as those in the UK. In the UK, the policy implementation process remains distinct from the formulation process.

However, the lack of explicit requirements for waste minimization allows the implementers to incrementally alter the objectives of hazardous waste policies by interpreting and adjusting them to various institutional, economic, and social constraints.

A third pattern of implementation occurs when interest groups who have been recognized as having an important role in the decision have only downstream access in the policy-making process. This pattern is characterized by the high level of controversy which can halt the implementation process. In the Italian policy-making system, for example, regional governments have access to the policy formulation process through institutionalized feedback mechanisms. However, this access is relegated to the final stages of the process and is limited in its scope.

A fourth implementation pattern emerges from the ability of central institutions to recognize that hazardous waste minimization gives rise to conflicts of interest which must be resolved in the policy making process. This pattern characterizes those cases, such as the Dutch policy-making system, where the complexities and controversies of implementing hazardous waste policies are anticipated in the policy formulation process and affect the way that policies are set. This results from the active involvement of the target groups right from the start in drafting measures aimed at the minimization of hazardous waste. As a result the policies are open-ended and policy implementation is more effective.

These distinct patterns of implementation exemplify the relationships between policy implementation and policy formulation that I have observed in the four countries I have studied. They also show how national hazardous waste policies in all these countries are transformed and fail to accomplish their goal as a result of the interests in conflict in the policy implementation process. Except in the Dutch case, public agencies fail to recognize the

interests and to open the policy making process to all parties involved.

The failure of the policies aimed at minimizing hazardous waste can be best explained by examining why public agencies fails to recognize these interests. There are several reasons that may explain this. One major reason is that within the political system there are forces interested in maintaining these conflicts and who benefit from them. These interests emerge if we examine the relationships between the actors that are included in the policy making process. Political leaders, who want to be re-elected, have an interest in short term results of their policies, so they are not motivated to promote policies that aim at long term benefits. Bureaucrats, who implements the policies, depend on political leaders for the resources to carry out these policies as well as for their job. On the other hand, the industry who has a sharp interest in avoiding the costs of managing its hazardous residuals, use its informal relationships with political leaders to exert control over the policy process.

In the next sections I summarize my findings and emphasize that the failure of European policies to meet waste minimization objectives can be ascribed to the conflicts among the actors and interests involved in the policy implementation process. I suggest that the involvement of interest groups and the resolution of conflicts during the policy-making process may explain the success stories among hazardous waste minimization strategies.

2.2 The German system of uniform technical standards

Policy and Regulation

The Federal Republic of Germany has established a comprehensive regulatory framework for hazardous waste management. Hazardous waste

minimization is promoted by a system of uniform technical standards, regulations on products, and economic incentives. The three German regulations for hazardous waste management that establish hazardous waste reduction requirements are the new Waste Avoidance and Management Act (1986), the Emission Control Law (1985), and the Dumping at Sea Act (1978).

The most recent regulation, the Waste Avoidance and Management Act, introduces four important provisions. First, it establishes and enforces the duty to minimize waste by means of waste avoidance or waste reuse and recycling. Second, it sets waste reuse and recycling as a priority over other disposal methods. Third, it authorizes the federal government to issue general administrative requirements for the management of specified categories of waste (Technical Instruction for Waste Management). Fourth, it introduces a new set of enabling orders for the federal government to adopt regulations aimed at avoiding or reducing waste. Among these enabling orders, particularly important are those that enable the federal government to issue ordinances in four main areas: (1) separate collection of wastes that need particular treatment, (2) labelling of products that contain hazardous substances; (3) duty of the industry to reaccept certain products after use, and (4) restrictions and prohibitions on the use, disposal and marketing of certain products if the release of hazardous substances cannot be avoided.

A major role in implementing hazardous waste minimization strategies across the eleven *landers* is played by a comprehensive system of uniform technical standards for recycling, treatment and disposal. This system is based on a catalog of preferred alternative technologies for managing specific hazardous waste streams which was developed by an inter-ministerial working group with the assistance of the Federal Environmental Agency (UBA). Under the Emission Control Act and the Dumping at Sea Act, it requires waste producers to adopt specific waste minimization options, where they are available. The whole regulatory framework is also constructed to

assure high quality performance standards and public control of hazardous waste management facilities.

Under the Emission Control Act, waste minimization requirements are part of the permitting process for industry. Waste producers are required to adopt the preferred options of waste recycling and reuse which have been identified by the Federal Environmental Agency (*Umweltbundesamt* or UBA). The Dumping at Sea Act establishes that licenses for incineration of hazardous waste at sea will not be granted if alternative methods exist for recycling, treating and disposing of these wastes. As it does with the Emission Control Act, under the Dumping at Sea Act the UBA promotes incentives to waste reduction by identifying and providing technical assistance for recycling and reuse technologies.

Through the UBA, the federal government also provides financial and technical assistance to develop and implement new technologies. The UBA grants aid investment for technology innovation up to 50% of cost. The Ministry of Technology and Research provides economic support for research and development in the field of solid waste, and the Ministry of the Interior offers capital grants to support modifications in manufacturing processes.

Implementation

The increasing trend in hazardous waste production in Germany shows that there are discrepancies between the intended and actual impacts of the measures aimed at minimizing hazardous waste. In fact, while the increasing stringency of hazardous waste standards has had a significant impact on the management of hazardous wastes, it has not been successful in promoting substantial minimization of hazardous waste. The Federal Minister for the Environment estimates an increase of 0.4 million tons between 1984 and 1987, though the proportion of hazardous waste recycled in 1987 reached 10.6%.

As a consequence of the trend towards increased generation of hazardous waste, the German Federal Environmental Agency, UBA, estimates a substantial increase in the demand for incineration and treatment facilities. This demand is expected to be exacerbated by two particular developments: the phasing out by 1995 of incineration of hazardous waste at sea, and German reunification. Thus in 1992 planners expect a total deficit in waste treatment capacity of 0.45-0.35 million tons, even after the planned new incinerators are built.

Parallel to the waste generation trend in Germany is the increase in the export of hazardous waste, which in 1988 reached 39.3% of total hazardous waste production. This trend is seen to follow the strengthening of standards and increased disposal costs, undermining the efforts of the German UBA to minimize hazardous waste.

Obstacles

In Germany, industry's increased interest in recycling hazardous by-products is clearly linked to the rise in the costs of disposal due to the strengthening of hazardous waste management standards. Thus far, however, the simultaneous trend towards increasing waste production has offset the results achieved in waste recycling. Moreover, loopholes in the control of transfrontier movements of hazardous waste to less regulated countries allow industry to avoid the increased costs of waste management imposed by more stringent standards.

The high capital costs of process and product substitution, which aimed at avoiding the production of hazardous wastes, are suggested by industrialists as one of the major constraints preventing industry from implementing hazardous waste strategies. Moreover, industry contends that reprocessing hazardous residues to obtain usable by-products may cost more

than purchasing virgin raw material.

My analysis of the obstacles the UBA encountered in minimizing chlorinated wastes shows, however, that cost is only one factor preventing the implementation of waste minimization strategies. As Illustration 1 shows, incineration at sea of chlorinated waste was significantly more expensive than reuse, when we consider the lost product value. In spite of the lower costs of recycling technologies, the chemical industry resisted these technologies, until it became clear that, under the Disposal at Sea Act, the UBA would not grant any further permits for ocean burning. Also, the availability of technology does not explain the difficulties the UBA encountered in implementing the Emission Control Act and the Dumping at Sea Act which require industry to adopt available technologies for waste prevention and recycling. As illustrated in the chlorinated hydrocarbons case, recycling technologies were available and cheaper than ocean burning.

The costs of implementing waste reduction and recycling are high compared to the cheaper option left to industry: to export its hazardous waste to other countries. Differences in stringency of regulations and disposal costs across countries allow German industry to escape the high national standards for hazardous waste management. This has considerably undermined the effectiveness of the waste minimization policies that rely on mechanisms to internalize the costs of pollution in waste management.

German industry explicitly opposes regulations which prescribe specific requirements on production processes and products, arguing that these regulations make it difficult for German industries to compete on the international market. Conflicts between government and industry on the regulation of hazardous waste have emerged, particularly in regard to the implementation of technical standards for specified waste streams under the Emission Control Act and the Dumping at Sea Act, as shown in Illustration 1.

Recently conflicts have arisen over the provision for labelling certain products such as PVC and PET containers under the Waste Avoidance and Management Act, as shown in Illustration 2. Industry has also challenged the most recent proposal by the Ministry of the Environment which introduces a tax on waste generation, threatening to close down several plants.

Industry's response to stricter regulations on hazardous waste has been to avoid compliance, either by finding loopholes or by exporting wastes to less regulated countries. In fact a major barrier to successfully implementing policies aimed at minimizing hazardous waste is the option left to industry to export its waste to less regulated countries.

Illustration 1: From incineration to minimization of chlorinated hydrocarbons

The German Dumping at Sea Act adopts the mandates of the Oslo and London Conventions, establishing that hazardous waste dumping and ocean burning, which will be phased out in 1995, are subject to licensing. These licenses will be granted only if land-based alternatives are not available and no adverse impacts on human health, living resources, or other uses of the sea are incurred. The German interpretation of the convention mandate is particularly extensive. First, it includes waste reduction, recycling and reuse options among the alternatives to ocean burning to be considered. Second, the probable adverse impacts indicated by scientific studies are considered to justify denying licenses for incineration at sea.

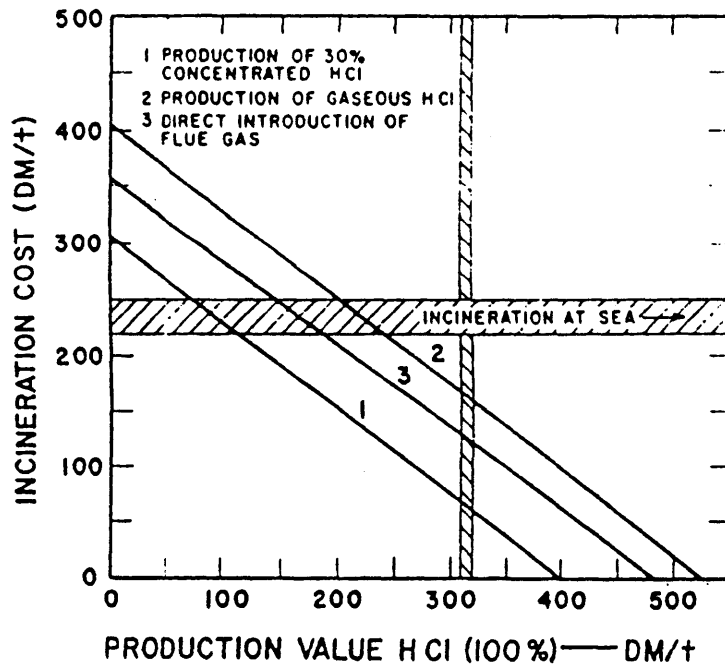
On this basis, the UBA, the federal environmental agency in charge of implementing the Act, denied German chemical industries licenses to incinerate chlorinated hydrocarbons at sea, contending that a recycling technology was available. The chemical industries opted to develop recycling technologies that responded to their specific production processes and requested temporary waivers for incineration of waste at sea. The firms rejected several attempts by the UBA to find alternatives for temporary treatment and land disposal in the Netherlands as well as in Germany. Several cases ended in court while the German industries were continuing to incinerate the chlorinated waste at sea, defying the international conventions.

The reason chemical industries so strongly resist adopting alternatives to ocean burning is generally ascribed to the increased costs and technical complexities involved in restructuring production processes to match the

UBA's requirements. In developing alternatives to ocean burning of hazardous waste, the UBA has given high priority to waste reduction and recycling options which required changes in the production process and cooperation between different firms in order to recycle such wastes. In addition, the UBA's alternatives implied slightly higher costs than ocean burning, when measured in the short run.

The UBA has made important progress in implementing the Disposal at Sea Act for minimizing chlorinated hydrocarbons, as it has taken new steps to confront these problems. One major step to counter industry's resistance, is that the UBA reconceptualized selected high risk wastes as "valued resources." Recycling technologies for highly chlorinated hydrocarbons are cheaper than ocean burning if measured in the long run and considering the lost product value. Figure 2.1 shows the relationship between the cost of ocean burning and the value of the product (HCl) for three alternative procedures to reuse highly chlorinated waste.

Figure 2.1
Cost of Residue Incineration with HCl Recovery



Source: H. Land, "Abf

en an

Another important step by the UBA was to differentiate the strategies to match the different chemical qualities of chlorinated hydrocarbon wastes. It established a *three-tier management scheme* to identify the most appropriate control strategies to match different waste streams on the basis of their specific chemical characteristics and potential recoverability, as illustrated in Table 2.1. The rationale for differentiating chlorinated hydrocarbons is the different potential for recycling of highly, moderately and slightly chlorinated wastes, which in fact have different potentials for recycling and create different environmental problems. Based on the differing content of chlorine, these wastes are directed on different routes for reuse or land-based incineration alternatives. Highly chlorinated waste, which poses the most serious environmental problems if incinerated, has a high potential for reuse as a raw material; waste with a low chlorine content, which has no material value, can more easily be destroyed in sophisticated incineration plants.

The figures on incineration of hazardous waste at sea provided by the German Ministry of the Environment show a decrease between 1980 and 1983 from 64,866 tons to 37,177 tons, which was followed by an increase to 60,000 tons in 1987. As a result of the UBA's policy, there has been a significant shift in this trend between 1987 and 1990, reducing the amount of waste incinerated at sea to 25,000 tons. More than 60% of the waste previously incinerated at sea was recycled, while the rest was incinerated on land. At present most German chemical industries have phased out their at-sea waste incineration, while others are close to doing so.

Source: Hans Sutter, UBA, FRG 1990; Hans Sutter, *Mull and Abfall*, April 1984. Bruce Piasecki and Hans Sutter, 1987.

Table 2.1

Three-tier management scheme
for chlorinated hydrocarbon wastes

Waste	Method	Product	Process (examples)
Highly chlorinated	Chlorination	Trichloroethylene	Chloe
	Oxichlorination	Trichloroethylene & Perchloroethylene	PFG
	Perchlorination	Perchloroethylene & Carbon tetrachloride	OMI, Boechst
	Combustion	Hydrogen Chloride Hydrochloric acid Heat	Uhde, BASF, Chloe, Nittetu, John Zink Stauffer
Moderately chlorinated	Combustion	Hydrochloric acid Heat	similar to highly chlorinated waste generators
	Distillation Extraction	Solvents	many methods
Slightly chlorinated	Hazardous waste	HCl (not recovered)	HDM, GSB
	incineration	Heat	

Source: H. Fricke, "Zwangsfall von Rückständen und ihre Bereitungsmöglichkeiten an Land," *Abfallbeseitigung auf See, Beihefte zu Müll und Abfall* 17 (1980).

Illustration 2: Labelling PVC containers

According to the Waste Avoidance and Management Act (Fourth Amendment), the federal authorities regulate specific products that contain hazardous waste by the use of a labelling system and restrictions on their sale and disposal. The proposal to shift from an advisory to a mandatory measure for industrial products produced enormous controversies in Germany. Industry claimed that these measures would undermine the competitiveness of German manufactured products on both the domestic and the international markets. On the other hand, environmentalists argued that these measures were not strong enough to motivate industry toward waste minimization.

Before the amendment on labelling was enacted, the federal government asked the UBA to identify examples of priority product labelling to be considered for regulation. The UBA proposed labelling of plastic containers containing polyvinyl chloride (PVC) because of the increasing trend toward using plastic packaging: the use of plastic bottles, particularly PVC and PET containers, has risen sharply in Germany in the last decade. Moreover, the overall use of one-way forms of packaging increased considerably, while the proportion of beverages in returnable containers fell from approximately 90% to 74% between 1970 and 1988.

The response of relevant manufacturers to the UBA proposal was to ensure immediate voluntary compliance in order to prevent the enactment of mandatory measures.

Sources: UBA, Labelling PVC and PET; Interview with Christoph Ewen, in charge of hazardous waste policy research at the German Oko-Institut.

2.3 The Italian Regional Planning System

The Policy and Regulations

The Italian strategy to promote hazardous waste reduction and recycling relies primarily on elaborating and implementing regional plans. DPR 915/82 had already asked regional governments to develop and implement regional plans and identify proper sites for waste management facilities. Law 441/87, passed in response to the failure to implement such provisions, strengthens the measures established by DPR 915 and requires that the regional government make waste recycling and recovery a priority in developing regional plans. Moreover, the more recent Law 475/1988 assigns to the prime minister the responsibility to adopt a three-year national program to reduce the amount of hazardous waste produced and to provide financial assistance to industries for innovative technology consistent with the scope of the program. However, the regulation did not establish precise rules to achieve reduction targets. Other measures aimed at reducing the generation of hazardous waste, adopted along with Law 475, are: the institution of specific mandatory centers for recycling of secondary materials at both the regional and inter-regional levels with minimum targets to be achieved, and a tax on the production of plastic bags (See Illustration 4).

Implementation

Data on industrial and hazardous waste in Italy do not allow a reliable assessment of current trends. The Ministry for the Environment estimates that 43.7 million tons of industrial waste were generated in Italy in 1989. Lack of data also preclude a reliable breakdown of the hazardous waste generated, into the various management methods used. However, estimates of the percentage of waste disposed of in landfill, incinerated, treated and recovered in the principal industrial regions show that a very small amount of waste is

incinerated or handled by treatment companies or converted for reuse, compared to disposal in landfill.

In Italy, instead of focusing on minimizing hazardous waste, a high priority is placed on the minimizing environmental impact of hazardous waste by ensuring that it is properly handled and managed. In fact, the failure of regional governments to develop and implement regional plans has caused enormous environmental problems with large amounts of hazardous waste dumped in illegal landfills or exported to less developed countries. As clearly stated in a report on the Treatment and Disposal of Hazardous Waste, carried out at the Commission of European Communities, "there is a considerable difference between the theory of hazardous waste management in Italy as set out by the legislation and the reality of its level of implementation."¹ In addition, there is a considerable difference in the stringency of regulations and levels of implementation across regions as the regional governments are in charge of adapting and implementing the national legislation at the local level.

Obstacles

The failure to implement hazardous waste minimization strategies in Italy can be explained by examining the impasse experienced by regional authorities in the process of developing and approving regional plans. Conflicts among social, economic and political actors are the major cause of this impasse. The dynamics of such conflicts and their impact on the implementation of hazardous waste policies are exemplified by the Tuscany regional plan (Illustration 3). As illustrated in Chapter 1, almost all the regional plans gained approval only in 1989; after that the Ministry for the

1. Environmental Resources Limited, 1989, *Charges for Treatment and Disposal of Hazardous Waste*. Prepared for the Commission of the European Community DGXI, October 1989, London, UK, p. 27.

Environment told regional governments that he would act in their behalf if the regions had not reached agreement by an established deadline.

Illustration 3: Waste minimization through emergency planning: The Tuscany Plan

The Tuscany Regional Plan for Hazardous Waste Management was approved in March 1989 after a controversial five-year formulation process. The focus of the controversy was the siting for a regional hazardous waste treatment and disposal facility which was intended to provide the region with the needed capacity for hazardous waste treatment and disposal.

The Tuscany plan addresses each of 160 hazardous waste categories, identifying the proper technologies for treatment and disposal as well as the opportunities for reuse. It also anticipates long-term opportunities for reusing 54.7% of the total hazardous waste produced in the region, which reaches 166,240 tons per year. In the short term, however, the plan gives high priority to satisfying the existing demand for hazardous waste treatment and disposal. According to the director of the regional hazardous waste department, "in order to achieve the optimal sequence of hazardous waste management options, in Italy it is first necessary to secure proper methods for disposal and treatment of hazardous waste." To this end, the plan creates provincial facilities for provisional storage of hazardous waste and a regional transfer point for treatment and final disposal, to be used for the hazardous waste from provincial plants.

The implementation of Tuscany's hazardous waste plan was constrained by the enormous controversy concerning the siting of the hazardous waste treatment facility, including a landfill and an incineration plant, as the regional plan mandates. A first draft of the Tuscany hazardous waste plan was written by the

regional government in 1985 based on a preliminary evaluation of the hazardous waste sources in the region. This scheme identified three sub-regional areas for which three landfills and two incineration plants were considered necessary in order to provide adequate capacity for hazardous waste treatment and disposal. At that time a study was commissioned in order to select the proper technologies and the most suitable sites for these facilities. As a result of this study, 14 potential sites were identified in the region, which were then inserted into the first draft plan submitted by the regional government to the Council for approval in 1987. The Council rejected the proposed plan on the basis that before adopting the plan, additional information and technical evaluations were needed in order to estimate the actual demand for hazardous waste treatment and disposal facilities and the current capacity.

After the regional government produced this new information, the regional council submitted and approved a new plan in 1989. The new plan identified nine sites for provisional collection and storage of hazardous waste and a regional transfer site. Additionally, the regional government assigned to a regional commission the task of identifying the most suitable site, as well as an integrated system and technologies for the regional transfer site. Based on an assessment of six potential sites, the commission concluded that the optimal site for a regional plant was located near the small town of Santa Luce.

Local residents opposed the potential site identified in the plan. They claimed that the new landfill would pose unacceptable risks for public health and would affect agriculture. Environmental organizations, which supported the local opposition, argued that Tuscany's plan did not meet the preference criteria for hazardous waste management established by Law 913.

The national environmental organization Lega per L'ambiente argued that an environmental impact assessment should have been undertaken, to consider alternatives to the landfill. On the other hand, the industries that supported the choice of Santa Luce claimed that they could not be blamed for improper management if the regional government would not provide sufficient capacity for hazardous waste disposal.

The controversy around the siting of the hazardous waste plant has halted the process of implementing the overall measures established in the Tuscany plan. To date, the siting process for the regional hazardous waste facility mandated by the plan is stalemated. In light of the strong opposition of local residents and of the Santa Luce municipality, the regional government is reconsidering its decision. Moreover, only 30% of the provisional provincial sites for hazardous waste collection have been established and most of the provinces face enormous difficulties in establishing joint ventures with the private sector, which is not willing to take on the risks involved in the hazardous waste management business.

Sources: Tuscany Regional Waste Management Plan, 1989; Public meeting on hazardous waste siting, Santa Luce, Italy 1990; Interview with Giovanni Barca, Director of the Regional Department for Hazardous Waste Management at the Tuscany Regional Administration, October 7, 1991; Interview with Duccio Bianchi, in charge of hazardous waste issues at the national environmental organization Lega Ambiente, October 10, 1991.

Illustration 4: The Italian tax on plastic bags

A tax on non-recyclable plastic bags was adopted in Italy under Law 475 of 1988. The tax was meant to reduce the amount of plastic in use bags and encourage industry to use recyclable materials for packaging. The tax, which consists of a charge of about 10 cents per plastic bag manufactured, has been transferred to consumers by charging the same amount for each bag previously provided at no cost.

The decision to adopt this tax is the result of a controversy over plastic packaging arose began in 1986. Following a World Wildlife Fund appeal called 1000 Mayors Against Plastic, 200 Italian majors banned plastic bags and PVC containers. The Italian associations of plastic materials manufacturers, processors and machine tool producers responded to the ordinances issued by the mayors, through an appeal to the regional administrative courts. The Courts ruled in favor of the industrial associations on the basis that "plastic packaging cannot be blamed for the serious urban waste disposal problems" which exist in Italy. Also in a few municipalities the ban was considered to be in conflict with the principle of free trade of goods across the Italian and EC markets.

Sources: World Wildlife Fund, 1000 Major Against Plastic 1986; C. Crignaschi, Assocomplast, *Resources, Conservation & Recycling*, No 2, 1988; Lega per L'Ambiente, Campaign on Plastics, Rome 1988.

2.4 The Dutch policy on Priority Waste Streams

Policy and Regulations

The Dutch approach to hazardous waste minimization is based on an integrated permitting system that includes air and water emissions and waste management. This approach encourages the minimization of hazardous waste production by requiring industries to replace inefficient systems and technologies that produce high amounts of waste. The Dutch emphasis on production processes is aimed at building compliance with hazardous waste minimization policies into the industrial production process and at creating self-enforcement mechanisms. The ban on land disposal of hazardous waste, plus the stricter standards for managing hazardous waste established by the Chemical Waste Act, were also supposed to affect waste management costs and lead the industry to take measures to minimize their hazardous residuals.

In 1988 a Memorandum on the Prevention and Recycling of Waste, issued by the Dutch Ministry for the Environment, emphasized the limited progress achieved. Prevention and recycling objectives were established for 29 priority waste streams for the year 2000 (Table 2.2). These waste streams include: used oil, car tires, car wrecks, batteries, iron in domestic waste, phosphoric acid, gypsum, glass, waste substances containing halogenated hydrocarbons, jarosite, plastic waste, waste paper and cardboard, oxylime sludge, shredder waste, slag and fly ash from incineration of industrial waste, spray paint waste, blasting sand, waste from packaging, and other items. These waste streams were given priority on the basis of the hazard to public health and the environment they pose, the space they occupy, and nuisance aspects.

Reduction targets and implementation plans are set jointly with

Table 2.2

Priority Waste Streams

Major flows (> 100x10 ⁶ kg/year)	Minor flows (< 100x10 ⁶ kg/year)
1. Jarosite	15. Batteries
2. Manure surplus	16. Flyash from incineration of domestic and industrial waste
3. Building and demolition waste	17. Halogenated hydrocarbons
4. Car wrecks	18. Spray and paint waste
5. Dredging material (Class I, II, III and IV)	19. Shredder waste
6. Incineration slag of domestic and industrial wastes	20. Used oil
7. Blasting sand	21. Staining baths thermal galvanization
8. Sewage sludge treatment plants	
9. Plastics waste	
10. Packaging waste from households	
11. Oxylime sludge	
12. Phosphoric acid gypsum	
13. Contaminated soil	
14. Cargo residues, wash water, chemicals, edible oils	

Source: VROM

industry and other target groups through so-called "strategic discussions." The Dutch National Research Institute for the Environment (RIVM) is in charge of producing "Informative Documents" for each specific waste stream to facilitate these discussions. This new process culminates in setting "implementation plans" (or covenants) in which are specified measures and deadlines for hazardous waste prevention and recycling. An example is given in Illustration 5. Although it is too early to judge the effect of this new policy, current progress can be assessed in light of the implementation problem that this new policy is expected to solve.

Implementation

The Memorandum on the Prevention and Recycling of Waste (VROM, 1988) emphasizes the limited progress achieved so far in reducing hazardous waste. In the period 1986-1990 the total amount of waste generated in the Netherlands has increased from 49 million tons to 52 million tons. Chemical waste, which constitutes 80% of hazardous waste, increased from 1 million tons to 1.5 million tons between 1980 and 1990. This increase has occurred in spite of the rise in treatment and recycling (70% of total chemical waste) that followed the adoption of the Chemical Waste Act.

The recent Dutch report on the state of the environment, *National Environmental Outlook 1990-2010*, confirms this trend and indicates that the volume of chemical waste reported under the Chemical Waste Act has increased dramatically during the period 1980-1990. Due to the lack of sufficient processing capacity in the Netherlands, about 30% of such waste is exported to surrounding countries, especially to eastern Germany.

Obstacles

The major factors affecting the implementation of the Dutch policy are

the cheaper options provided by the national and cross-national loopholes in the regulation of hazardous waste. A major gap in the national regulation is the possibility for industries to manage hazardous waste without a license at the site where it is generated -- which explains the high percentage of chemical waste (50% of the total produced) managed on site.² A second option for industries to escape control is provided by the differences in national regulations that encourage the export of hazardous waste to less regulated countries. Stricter regulations for hazardous waste management, combined with the limited capacity of existing facilities and the difficulties of siting new facilities, have raised the amount of chemical waste exported between 1984 and 1990, from 120×10^6 kg. to 198×10^6 kg.³

The new Dutch policy on priority waste streams is meant to counter these trends by setting specific reduction targets and working in cooperation with target groups to identify the measures to be adopted to meet established targets by the years 1994 and 2000. In light of the agreement and commitment that industry has achieved so far on a number of waste streams, this policy is expected to meet the overall target of 5% reduction by the year 1994 and 10% by the year 2000. A parallel project, developed by the Ministry of the Environment and adopting the same methodology to set reduction targets for the emissions of volatile organic compounds (VOCs), is summarized in Illustration 6.

As a result of the new prevention policy, the Dutch Ministry for the Environment expects that the annual growth of the waste supply during the period 1990-2010 will be reduced from 1.3% to 0.9%. Currently, plans are being drafted jointly with waste producers in order to meet the objectives set

2. Ministry of Housing, Physical Planning and the Environment, 1988.

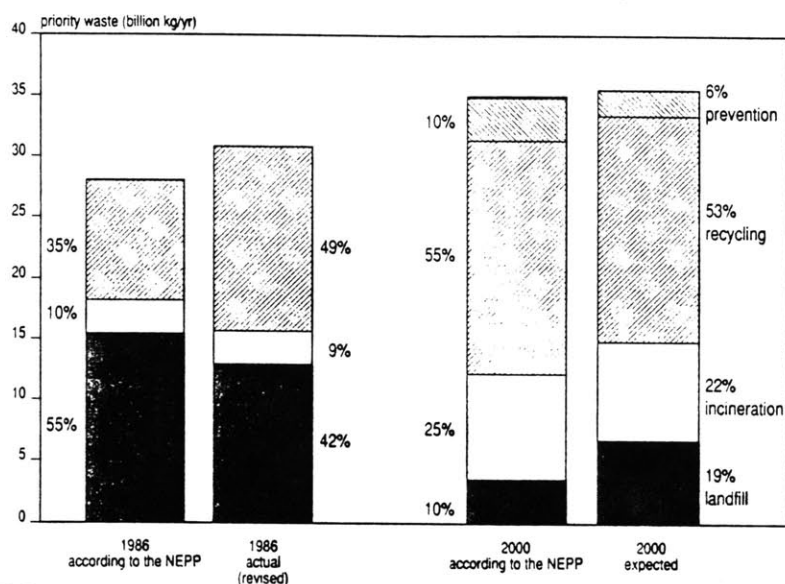
3. Ministry of Housing, Physical Planning and the Environment, the Netherlands, *Essential Environmental Information*, 1991, p. 100.

in the NEPP on waste reduction, reuse, incineration and landfills. In June 1991 the government and industry agreed on a detailed implementation plan for the prevention and recycling of packaging. Agreements are also close to finalization with the chemical and metal-finishing industries on other priority waste streams.

As the policy only began in 1989 and extends to the year 2010, it is not possible to assess its impact on waste production in the Netherlands.⁴ Important progress has been made so far, as proven by the agreement on packaging, which is considered one of the most controversial waste streams. The chance for this new policy to succeed is also increased by the success of the agreement for the reduction of VOCs that was reached by using the same methodology (See Illustration 6). The Dutch Ministry for the Environment is concerned, however, that the prevention policy will have to be intensified if the NEPP target of 10% waste prevention is to be achieved by the year 2000 (Figure 2.2).

Figure 2.2

NEPP Objectives and Expected Developments



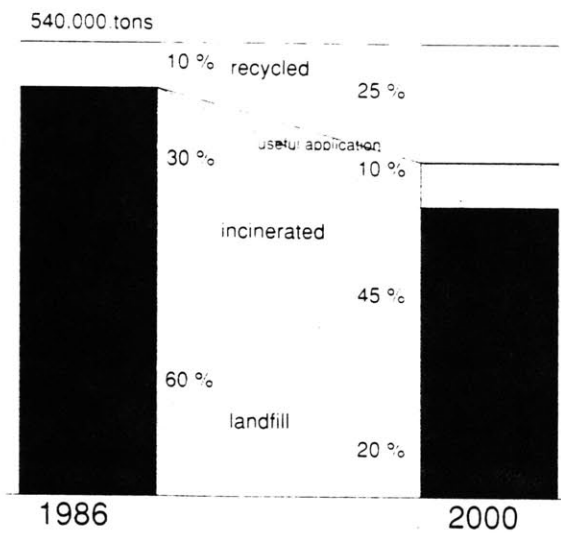
Source: RIVM, 1992.

4. Interview with Mr. J.R.K Smit, RIVM - LAE, Bilthoven, the Netherlands.

Illustration 5: Waste Plastics

Waste plastic is one of the 29 priority waste streams for which the Memorandum on Waste Prevention established targets for prevention and recycling by the year 2000 (Figure 2.3). In 1986, the total amount of plastic waste produced in the Netherlands was 722,000 tons. Of this, only 53,000 tons were recycled, while 669,000 were incinerated.

Figure 2.3
Plastic Waste Targets



Source: RIVM, 1989

RIVM estimates that the quantity of plastic waste in the year 2000 would amount to approximately 1 million tons if waste policies remain unchanged. This estimate is made by assuming that the increase in the quantity of plastic waste is the same as the increase in the total quantity of waste (i.e. without further substitution of plastic for other materials) and that the assumed relationships between production and consumption on one hand and the quantity of waste on the other hand is correct.

Increasing concerns for the environmental impacts resulting from plastic waste have led the Dutch Ministry for the Environment to place the minimization of plastic waste among the priorities in its waste prevention policy. The Waste Prevention Memorandum establishes targets to raise the actual rate of plastic waste recycling from 10% to 35% of total plastic waste produced and to reduce landfill of such waste from 60% to 20%. An increase of 15% in the incineration of waste plastics is considered to help accomplish this.

Currently, the government has started strategic discussions with industry, consumer organizations, environmental organizations and other involved parties in order to set an implementation plan. To facilitate such discussions, sharing a common understanding of the problem was considered essential. RIVM was requested to prepare an informative document to provide facts and figures about the plastic waste stream as well as a prognosis and the options for realizing minimization targets. All the parties involved commented on a first draft of the document in order to produce the necessary information for drafting the implementation plan.

After identifying future trends in the production of plastic waste, the document analyzes the environmental aspects of disposing of plastic waste by various methods, pointing out the major concerns regarding landfill, incineration, and other treatment techniques. The leaching of softener and metals as well as the space required are two major problems of landfilling plastic waste. Emissions of hydrochloric acid and dioxines as well as the contamination with heavy metals of fly ash are a result of incineration. Pyrolysis, gasification and hydrolysis are not considered proven techniques.

A subsequent section of the RIVM document sketches the possible options for prevention and recycling. Quantitative prevention should include: reducing the amount of total waste from industrial processes involving plastics; redesigning products to be more lightweight; replacing plastics with other materials; extending product life cycles; and restricting the use of certain products. Qualitative prevention could include: cutting down the presence of priority substances in plastics; reducing the use of PVC; replacing PVC by other plastics. Successful recycling can be achieved by: lowering the price of secondary products; ensuring the high quality of waste products; and improving the efficiency of waste collection systems.

The comments by the parties involved, which were published together with the RIVM responses in the final document, are an interesting summary of the controversies on waste minimization. On one side, industrial associations disagreed with both the assessment of potential impacts of management methods and on the options considered to achieve minimization targets. They claimed that there is no evidence of a direct relationship between the quantity of PVC in the waste and dioxin formation. They also denied the presence of heavy metals in plastic waste.

On the other side, environmental and consumer organizations pointed out that an assessment of environmental impacts of the production phase of plastic must also be considered.

Although the results of the "strategic discussion" on waste plastics can be evaluated only after waste minimization targets have been implemented, two important conditions for the implementation of waste minimization targets to succeed have been achieved so far. First, the current discussion has improved the level of communication among the parties involved and gave them the opportunity to share important information about the obstacles to minimize waste. Second, it has committed the parties to cooperating to find a solution.

Sources: Memorandum on Waste Prevention, Second Chamber of the States General 1988-89, 20 877 No.2; National Environmental Policy Plan, 1988-89 21 137 No. 1-2; RIVM, *Waste Plastics*, Informatiedocumenten Afvalstoffen, December 1989, RIVM - LAE, Bilthoven, the Netherlands.

Illustration 6: The KWS Hydrocarbons 2000 Project

KWS 2000 is a long-term project developed by the Dutch Ministry of the Environment to achieve a substantial reduction in the emission of hydrocarbons and other volatile organic compounds (VOCs) in order to reduce the concentration of ozone in the lower atmosphere to acceptable levels. The project was carried out between 1986 and 1988 by applying an interactive method of policy-making as a joint exercise among the main interest groups. These were: the central government, represented by the Ministry of Environment and the Ministry of Economic Affairs, plus industry and local governments.

Although the ultimate success of the project can be assessed only on the actual achievement of the VOCs reduction targets, the project has been judged quite successful by the participants in light of the results achieved. These include four main products:

1. A reduction plan which establishes: a reduction target up to almost 60% of emissions, the sources which must make emission reductions, and the timing and intermediate targets to achieve those targets.
2. Commitment to the strategy by industry and other parties.
3. An action plan to implement the emission reduction targets.
4. A policy management plan which sets up the arrangements by which the progress of the implementation plan will be promoted, monitored, reviewed, and adjusted as required.

Source: VROM/DGM, 1991. *Project KWS 2000*. Den Haag, the Netherlands.

2.5 The UK's discretionary and decentralized system

Policy and Regulations

The UK's approach to regulation for hazardous waste management is characterized by the decentralization of authority and high levels of technical discretion. Presently no specific national policies aim to encourage hazardous waste reduction. The decision to take action towards waste minimization is left to the initiative of local authorities in charge of implementing and monitoring the regulation of hazardous waste. Compared to the other European countries in this study, the UK is conspicuous for its lack of uniformity of standards across the numerous local waste disposal authorities and its end-of-pipe approach to regulation. Although most counties rely primarily on landfill, a few of them have actively attempted to achieve waste minimization at local level (Illustration 7).

After reviewing hazardous waste management in light of these different realities, the national government created a centralized Hazardous Waste Inspectorate in 1987, which is now part of Her Majesty's Inspectorate of Pollution (HMIP). Recent changes in the regulatory approach have been also introduced with the new Environmental Protection Act of 1990. Under this new act, the minimization of emissions and waste is pursued by a system of Integrated Pollution Control (IPC) and the requirement of the Best Available Technology Not Entailing Excessive Cost (BATNEEC) for specified industrial processes. In order to operate, 5,000 industrial processes will need authorization from HMIP. Moreover the introduction of a "Duty of Care" for controlled waste is expected to strengthen control over the handling, movement, and treatment of hazardous waste so as to indirectly promote increased prevention and improved management of these residues.

Implementation

The generation of hazardous waste in the UK reached 4.8 million tons in 1988 (i.e., an increase of 1 million tons since 1986). Given the high flexibility of standards in the UK, land disposal remains the cheapest option and the primary method to manage hazardous waste. The Department of the Environment estimates that currently 80% of hazardous waste are disposed of in landfills, while only 8% are submitted to physical or chemical treatment and less than 2% are incinerated.

Obstacles

The low cost of land disposal in the UK has largely undermined the effectiveness of incentives to develop alternative methods; it has also created incentives for the import of waste from other European countries where regulations are stricter. As shown in Chapter 1, in 1987-88 the UK imported 80,000 tons of hazardous waste, far more than three times the amount (24,000 tons) it imported in 1984-85. The new Duty of Care introduced with the Environmental Protection Act of 1990 is expected to reduce this trend.

Ultimately, major incentives for waste minimization in the UK are provided by external pressure from other EC member states. In fact other member states the pressured the UK to tighten hazardous waste management standards; they hold that more flexible regulations in the UK produce distortions in the European market. Furthermore, the chemical industry, which is an actor on the international market, is likely to anticipate actions aimed at reducing their hazardous residuals under the pressure of stricter regulations in other countries. This is evident in Illustration 8, which describes the development of a plan to eliminate 50% of the waste at the UK multinational chemical industry, ICI.

Illustration 7: Waste minimization at local level: The West Midlands County

Since 1983, West Midlands County has been operating an active waste exchange service to promote recycling by linking waste producers with potential users. The West Midland County Council identifies and classifies producers of valuable waste and potential users of such waste as secondary materials. The waste exchange scheme focuses on wastes which pose potential harm to the environment and public health and which have a large potential saving in disposal costs.

The county council estimates that the scheme has produced about \$100,000 per year for waste producers and additional cost savings in raw materials for the users. The success of the scheme is particularly evident for small and medium size firms where obstacles to recycling are primarily associated with the limited range of activities, variability in by-product quality, transportation costs, and irregularity of supply.

Source: West Midland County Council, UK.

Illustration 8: The ICI Case

The UK multinational chemical company, ICI, has recently developed a plan to eliminate 50% of the waste produced by its plants worldwide by the year 1995. The plan is based on a global assessment of the environmental performance of production processes and waste flows of different sectors and branches within the industry. It includes four main objectives:

- * to reduce by 50% its waste generation by 1995, ensuring that off-site treatment and disposal of waste take place at facilities in full compliance with regulations;
- * to set standards for new production plants at the highest level required by the most environmentally demanding country in which ICI operates (such as the US, Germany and the Netherlands);
- * to develop a new policy on recycling within the company; and
- * to strengthen energy and resource conservation programs.

The costs of implementing the waste reduction plan will double the company's environmental spending to \$1,970,000 in the next 4 years.

ICI has already successfully introduced several changes in production processes and products which have resulted in waste reduction and cost saving. One example is the substitution of a water-based paint for a solvent-based paint at ICI Paints which annually produces 27,000 tons of solid waste of which 10% is sludge. At the ICI's plant in Stowmarket (UK), this policy has resulted in a two-thirds reduction in the use of solvents.

Source: ICI Chemicals, UK; *Haznews* No 34, Jan. 1991; *Haznews* No 38, May 1991.

2.6 Cross-country analysis

The increased generation of hazardous waste in Germany, Italy, the Netherlands and the UK shows that European policies have failed in their intent to minimize hazardous waste. I have analyzed the obstacles encountered by the public agencies set up to minimize hazardous waste in each country and searched for patterns that could explain similar outcomes across these countries.

Regulatory approaches. My case studies show that regulations play an important role as they set objectives and measures to achieve the minimization of hazardous wastes. Different levels of environmental protection are achieved at hazardous waste sites depending on the stringency of control systems and enforcement mechanisms. Germany, for example, implemented a high level of environmental standards through centralized hazardous waste management systems. On the other hand, in the UK, where hazardous waste has so far been based on a decentralized and discretionary system, compliance with the national regulatory framework differ enormously from one county to another.

Different levels of protection can be also analyzed according to the way that the regulations in these countries allocate the economic costs of hazardous waste management among the private and public sectors. Higher standards for hazardous waste management and stricter regulations in the Western European countries are generally combined with extensive public financing of hazardous waste management facilities and of research and implementation of waste reduction technologies. Again, in Germany hazardous waste management is carried out by public or semi-public hazardous waste facilities to secure the use of state-of-the-art technologies and high quality standards. In contrast, in the UK, where hazardous waste regulations are more flexible, hazardous waste management is handled by the

private sector, and the technological standards are lower.

My case studies show that the presence of strict regulations per se is not a measure of the extent to which European countries have achieved hazardous waste minimization. In fact, as we can see from the increasing production of hazardous waste in Germany and the UK, similar patterns of implementation occur in countries that have adopted very different regulatory approaches. Moreover, similar implementation patterns can be observed in the UK and Italy where regulatory differences are also marked. The reverse is also true: although Germany and the Netherlands rely on similar levels of regulatory stringency, the results are often different..

Economic factors. The choices that industry makes, whether to avoid generating hazardous waste or to manage them through one of the available methods, are inevitably linked to the costs of these options. Different patterns of hazardous waste management across countries are clearly linked to recent trends in the costs associated with different options for managing hazardous residuals. Thus, the UK's low cost of land disposal explains the predominant use of landfills there. In the other countries, the increasing costs of land disposal have pushed industry towards treatment and recycling. However, increased waste generation in these countries has offset efforts aimed at minimizing hazardous wastes. Moreover, increased waste disposal costs in these countries do not directly lead to increased avoidance of hazardous waste. Associated with the increased cost of disposal in Germany and the Netherlands is the increasing export of hazardous wastes. Thus, the cheapest option left to industry -- exporting their hazardous wastes to less regulated countries -- has played the most important part in inhibiting the minimization of hazardous waste.

Technological constraints. Technological constraints are essential factors in understanding the different outcomes across various industrial

sectors and branches. The chances of implementing hazardous waste minimization, in fact, vary significantly according to the availability of technologies and their cost which in turn vary if we consider the different industrial processes. By itself, however, technology does not explain the implementation gap. This is evident in the German case where the UBA has found it difficult to implement requirements to adopt available alternative technologies for recycling chlorinated hydrocarbons, even if the alternatives were available and cheaper than ocean burning. Industries were forced to adopt these technologies as it became clear that the UBA would not grant permissions for ocean burning under the German Dumping at Sea Act.

Conflicts and tradeoffs. The patterns of implementation of hazardous waste policies across European countries can best be explained by examining the conflicts among interest groups and the ways that European public agencies handle these conflicts in the policy-making process. Inherent in hazardous waste issues are conflicts and tradeoffs that must be made in balancing economic costs and environmental risks as well as in the allocation of the cost of minimizing hazardous waste. The difficulties of implementation European policies aimed at minimizing hazardous waste can be best explained according to the way different public agencies deal with these conflicts in the policy-making process.⁵ The recent Dutch success in setting hazardous waste minimization targets can be traced to the active involvement of target groups in setting these measures.

5. These results confirm two other recent studies on waste reduction. The first, by Paul Palmer, attributes 60% of the influence to political factors, 30% to economic factors and 10% to technical factors. A second study, conducted by Donald Huisingh, confirms Palmer's results; in addition he observed different attitudes across different sizes and types of industry. See Donald Huisingh, "Cleaner technologies through process modifications, material substitutions, and ecologically based ethical values," *Industry and Environment* UNEP, January/February/March 1989, Vol. 12, No. 1, pp. 4-8.

CHAPTER 3
HAZARDOUS WASTE POLICY-MAKING:
A CONFLICT ASSESSMENT APPROACH

European policies aimed at minimizing hazardous waste are seen to fail in the implementation process due to disagreement among the parties involved on the measures to be adopted. Industry opposes tight standards because of the additional costs which they impose on production processes and on the management of their hazardous residuals. The public is concerned with the risks that hazardous waste may pose, and puts pressure on national governments to adopt more stringent regulations. Governments are concerned to protect public health and to respond to public concerns without weakening their economic position.

Loopholes in regulations, which allow industries to escape controls, reflect the conflicts among these interests and their exclusion from the policy-making process. Once regulations are enacted, the conflicts simply reemerge during implementation. The responses of target groups that oppose regulations and are not directly involved in policy-making range from non-compliance to explicit obstruction. Three key issues are at the center of these conflicts: the tradeoffs between economic development and environmental protection, the balance of risks against economic costs, and the distribution of costs among different groups, geographic regions, and human generations.

In this chapter, I highlight the conflicts among interest groups on the choices to be made and explain why these conflicts must be reconciled if hazardous waste minimization efforts are to succeed. Drawing on the current debate, I assess the policy options to achieve hazardous waste minimization and analyze the conflicts that are likely to emerge. I argue that success in implementing measures aimed at minimizing hazardous waste depends on the participation of social, economic, and political actors in drafting these measures and on the ability of European public agencies to resolve these conflicts.

3.1 Hazardous waste issues

Controversies in the policy-making process -- about the definition of hazardous waste, the risks involved and the control options that ought to be considered -- reflect conflicts among the actors and interests involved in hazardous waste issues.

The decision regarding what materials ought to be considered hazardous and the minimization targets to be achieved imply that there is agreement on the extent to which production and consumption processes need to be changed in order for development to be environmentally sustainable. Instead, there is disagreement among the parties concerning the risk involved in managing such waste and the extent to which hazardous waste can be prevented given current social, economic and technological constraints. At one extreme, the costs of waste reduction are considered to slow economic development. At the other extreme, measures aimed at minimizing hazardous waste are considered to reduce the costs and improve the efficiency of economic activities.

The different interests, values and perceptions of the parties involved are reflected in the dispute on the preference to be accorded to management alternatives. There are disagreements over the balancing of environmental risks against the economic costs involved in waste management and over the ingredients and time-frames to be considered in the equation. The uncertainty surrounding the environmental and health effects of hazardous substances released in disposing of hazardous waste adds to this controversy, making it impossible to estimate the costs and benefits of the different waste management options.

Furthermore, the control options to be adopted decide the way in which these costs and benefits must be distributed among different groups, geographic regions and human generations. The preferences accorded by the different

interest groups on different regulatory measures reflect how these different groups are affected by the equity versus efficiency tradeoff.

Definitions of hazardous waste

The controversy over hazardous waste begins with definitions. In fact, there is no agreement as to what constitutes a hazard or what constitutes waste. The boundaries of both are extremely unclear: What features distinguish a material from a waste? What substances, doses and potential effects make a waste hazardous? The fuzziness of the lines between waste and non-waste and between hazardous and non-hazardous becomes apparent when we try to answer these critical questions. A material can change its status from product to waste depending on the values attributed to it. A waste can enter the list of waste classified as hazardous depending on the presence, characteristics, and concentration of certain substances. The process of defining hazardous waste has both objective and subjective components. The objective component is the physical and chemical characteristics of materials which make these materials dangerous for the environment and human beings; the subjective component is the values attributed to them which make these materials waste.

To emphasize the hybrid character of hazardous waste, Michael Thompson argues that "hazard (or at any rate, the potential for hazard) is inherent in the material; waste is a quality that is conferred on it."¹ Often the line between hazardous and non-hazardous is drawn in the context of the scientific controversy concerning the potential of specific substances for harming human beings and the environment. But the properties that characterize these materials as being toxic, flammable, corrosive, and explosive are "out there in the real world." Conversely, the line between waste and non-waste is completely

1. Michael Thompson, "The Management of Hazardous Waste and the Hazard of Wasteful Management," in Hannah Bradby (editor), 1990, *Dirty words: writings on the history and culture of pollution*. Earthscan Publications, London, pp. 116-117.

determined by values, in that one industrial firm's waste is another's raw material, and "economic bads can become economic goods, sometimes by switching them from one place to another, sometimes from one person to another, sometimes by just waiting."²

In order to define, classify and describe hazardous waste, several different approaches can be considered. Yakovitz has summarized these approaches and has suggested that hazardous waste may be described by: type; category; technology of origin; generic grouping; specific prescriptions; or criteria leading to prescriptions. Materials can be discarded for different reasons such as those listed in Table 3.1. After being discarded these materials will be subject to one of several disposal operations which may or may not lead to resource recovery, recycling or direct reuse (Table 3.2). Materials which exhibit one or more of the characteristics listed in Table 3.3 may be described as hazardous wastes. Alternatively, hazardous wastes can be identified by their constituents or concentration of certain substances (Table 3.4). Wastes can also be described by their generic form or physical status (Table 3.5) or by the activities which generate them (Table 3.6).

The European Community defines as waste "any substance or object in the categories set in Annex I (Directive 91/156/EEC) which the holder discards or intends or is required to discard."³ Hazardous waste, as defined by a new directive on hazardous waste,⁴ refers to any waste classified as such in three annexes to the directive which specify the types of waste (Annex I) or constituents (Annex II) and the characteristics of materials which make them hazardous (Annex III). The definition of hazardous waste introduced with the

2. Michael Thompson, 1990, *op. cit.*, p. 127.

3. European Community Council Directive 91/156/EEC of 18 March 1991, *Official Journal of the European Communities*, No. L 78/32, 3/26/1991.

4. Council Directive on hazardous waste amending Directive 78/319/EEC on toxic and dangerous wastes, 12 December 1991.

Table 3.1

Reasons Why Materials are Intended for Disposal

- Q1 Production residues not otherwise specified below
- Q2 Off-specification products
- Q3 Products whose date for appropriate use has expired
- Q4 Materials spilled, lost or having undergone other mishap including any materials, equipment etc. contaminated as a result of the mishap
- Q5 Materials contaminated or soiled as a result of planned actions (e.g., residues from cleaning operations, packing materials, containers)
- Q6 Unusable parts, (e.g., reject batteries, exhausted catalyst)
- Q7 Substances which no longer perform satisfactorily (e.g., contaminated acids, contaminated solvents, exhausted tempering salts)
- Q8 Residues of industrial processes, (e.g., slags, still bottoms)
- Q9 Residues from pollution abatement processes, (e.g., scrubber sludges, baghouse dusts, spent filters)
- Q10 Machining/finishing residues, (e.g., lathe turnings, mill scales)
- Q11 Residues from raw materials processing, (e.g., mining residues, oil field slops)
- Q12 Adulterated materials, (e.g., oils contaminated with PCB)
- Q13 Any materials, substances or products whose use has been banned by law
- Q14 Products for which there is no further use, (e.g., agriculture, household, office, commercial and shop discards)
- Q15 Materials, substances or products resulting from remedial actions with respect to contaminated land
- Q16 Any materials, substances or products which the generator declares to be wastes and which are not contained in the above categories

Source: Yakovitz OECD, 1988

Table 3.2

Operations Which Do Not Lead to the Possibility of Resource Recovery, Recycling, Reclamation, Direct Re-Use or Alternative Uses of Wastes

(N.B. Table is meant to encompass all such disposal operations which occur in practice. These operations may or may not be acceptable from the point of view of environmental amenity.)

- D1 Deposit into or onto land, e.g., landfill
- D2 Land treatment, e.g., biodegradation of liquid or sludge discards in soils
- D3 Deep injection, e.g., injection of pumpable discards into wells, salt domes or naturally occurring repositories
- D4 Surface impoundment, e.g., placement of liquid or sludge discards into pits, ponds or lagoons
- D5 Specially engineered landfill, e.g., placement into lined discrete cells which are capped and isolated from one another and the environment
- D6 Release into a water body except seas/oceans
- D7 Release into seas/oceans including sea-bed insertion
- D8 Biological treatment not specified elsewhere in this Table which results in final compounds or mixtures which are discarded by means of any of the operations in Table 2.A
- D9 Physico-chemical treatment not specified elsewhere in this Table which results in final compounds or mixtures which are discarded by means of any of the operations in Table 2.A, e.g., evaporation, drying, calcination
- D10 Incineration on land
- D11 Incineration at sea
- D12 Permanent storage, e.g., emplacement of containers in a mine
- D13 Blending or mixing prior to submission to any of the operations in Table 2.A
- D14 Repackaging prior to submission to any of the operations in Table 2.A
- D15 Storage pending any of the operations in Table 2.A

Operations Which May Lead to Resource Recovery, Recycling, Reclamation, Direct Re-Use or Alternative Uses of Wastes

(N.B. Table is meant to encompass all operations intended to extract and/or to utilize materials which otherwise would have been destined for operations included in above table.)

- R1 Use as a fuel or other means to generate energy
- R2 Solvent reclamation/regeneration
- R3 Recycling/reclamation of organic substances which are not used as solvents
- R4 Recycling/reclamation of metals and metal compounds
- R5 Recycling/reclamation of other inorganic materials
- R6 Regeneration of acids or bases
- R7 Recovery of components used for pollution abatement
- R8 Recovery of components from catalysts
- R9 Oil re-refining or other reuses of oil
- R10 Land treatment resulting in benefit to agriculture or ecological improvement
- R11 Uses of materials obtained from any of the operations numbered R1-R10
- R12 Exchange of wastes for submission to any of the operations numbered R1-R11
- R13 Accumulation of material intended for any operation in Table 2.B

Table 3.3
Characteristics of Waste

Code Number	Characteristics
H1*	Explosive An explosive substance is a solid or liquid substance (or mixture of substances) which is in itself capable by chemical reaction of producing gas at such a temperature and pressure and at such a speed as to cause damage to the surroundings.
H2*	Oxidizing Substances which, while in themselves not necessarily combustible, may, generally by yielding oxygen, cause or contribute to the combustion of other materials. (Organic substances which contain the bivalent-O-O-structure are thermally unstable substances which may undergo exothermic self-accelerating decomposition.)
H3*	Inflammable The word "flammable" has the same meaning as "inflammable". Inflammable liquids are liquids, or mixtures of liquids, or liquids containing solids in solution or suspension (for example, paints, varnishes, lacquers, etc. but not including substances otherwise classified on account of their dangerous characteristics) which give off an inflammable vapour at temperatures of not more than 60.5°C, closed-cup test, or not more than 65.6°C, open-cup test. (Since the results of open-cup tests and of closed-cup tests are not strictly comparable and even individual results by the same test are often variable, regulations varying from the above figures to make allowance for such differences would be within the spirit of this definition.) Inflammable solids are solids, other than those classed as explosives, which under conditions encountered are readily combustible, or may cause or contribute to fire through friction.
H4**	Irritating Non-corrosive substances and preparations which, through immediate, prolonged or repeated contact with the skin or mucous membrane, can cause inflammation.
H5**	Harmful Substances and preparations which, if they are inhaled or ingested or if they penetrate the skin, may involve limited health risks.
H6*	Toxic Substances and preparations which, if they are inhaled or ingested or if they penetrate the skin, may involve serious, acute or chronic health risks and even death.
H7**	Carcinogenic Substances and preparations which, if they are inhaled or ingested or if they penetrate the skin, may induce cancer in man or increase the incidence (a).
H8*	Corrosive Substances which, by chemical action, will cause severe damage when in contact with living tissue, or, in the case of leakage, will materially damage, or even destroy, other items or a means of transport; they may also cause other hazards.
H9*	Infectious Substances containing viable micro-organisms or their toxins which are known, or suspected, to cause disease in animals or humans.
H10*	Liberation of flammable gases in contact with water Substances which, by interaction with water, are liable to become spontaneously inflammable or to give off inflammable gases in dangerous quantities.
H11	Liberation of corrosive fumes in contact with air or water.
H12	Liberation of toxic gases in contact with air or water.
H13	Capable, by any means, after disposal, of yielding another material, e.g., leachate, which possesses any of the characteristics listed above.
H14	Ecotoxic Substances which if released present or may present immediate or delayed adverse impacts to the environment by means of bioaccumulation and/or toxic effects upon biotic systems.

* Definition taken from *Transport of Dangerous Goods, Recommendations of the United Nations Committee of Experts on the Transport of Dangerous Goods, Third Revised Edition, United Nations, New York, 1985.*

** Definition taken from Article 2 of the European Communities Council Directive of 18th September 1979 amending for the sixth time Directive 67/548/EEC on the approximation of the laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances [Directive 79/831/EEC.]

(a) Guidance with regard to this characteristic may be obtained by consulting the lists of known and strongly suspected carcinogens published periodically by the International Agency for Research on Cancer.

Table 3.4

Code Number	Wastes having as constituents	Code Number	Wastes having as constituents
Constituents of wastes which render them hazardous			
C1	Beryllium; beryllium compounds	C30	Perchlorates
C2	Vanadium compounds	C31	Azides
C3	Chromium (VI) compounds	C32	PCBs and/or PCTs
C4	Cobalt compounds	C33	Pharmaceutical or veterinary compounds
C5	Nickel compounds	C34	Biocides and phyto-pharmaceutical substances, [e.g., pesticides, etc.]
C6	Copper compounds	C35	Infectious substances
C7	Zinc compounds	C36	Creosotes
C8	Arsenic; arsenic compounds	C37	Isocyanates, thiocyanates
C9	Selenium; selenium compounds	C38	Organic cyanides, [e.g. nitriles, etc.]
C10	Silver compounds	C39	Phenols; phenol compounds
C11	Cadmium; cadmium compounds	C40	Halogenated solvents
C12	Tin compounds	C41	Organic solvents, excluding halogenated solvents
C13	Antimony; antimony compounds	C42	Organohalogen compounds; excluding inert polymerized materials and other substances referred to in this Table
C14	Tellurium; tellurium compounds	C43	Aromatic compounds; polycyclic and heterocyclic organic compounds
C15	Barium; barium compounds; excluding barium sulphate	C44	Organic nitrogen compounds; especially aliphatic amines
C16	Mercury; mercury compounds	C45	Organic nitrogen compounds; especially aromatic amines
C17	Thallium; thallium compounds	C46	Ethers
C18	Lead; lead compounds	C47	Substances of an explosive character
C19	Inorganic sulphides	C48	Sulphur organic compounds
C20	Inorganic fluorine compounds excluding calcium fluoride	C49	Any congener of polychlorinated dibenzo-furan
C21	Inorganic cyanides	C50	Any congener of polychlorinated dibenzo-p-dioxin
C22	The following alkaline or alkaline earth metals: lithium, sodium, potassium, calcium, magnesium in uncombined form	C51	Hydrocarbons and their oxygen, nitrogen and/or sulphur compounds not otherwise taken into account in Table 3.5
C23	Acidic solutions or acids in solid form		
C24	Basic solutions or bases in solid form		
C25	Asbestos (dust and fibres)		
C26	Phosphorus; phosphorus compounds, excluding mineral phosphates		
C27	Metal carbonyls		
C28	Peroxides		
C29	Chlorates		

Source: Yakovitz OECD, 1988

Table 3.5

Code Number	Wastes which consists of	Code Number	Wastes which consists of
1	Anatomical substances; hospital and clinical wastes.	19	Animal or vegetable soaps, fats; waxes
2	Pharmaceuticals, drugs, medicines and veterinary compounds	20	Non-halogenated organic substances not employed as solvents
3	Wood preservatives	21	Inorganic substances without metals
4	Biocides and phyto-pharmaceutical substances	22	Ashes and/or cinders
5	Residue from substances employed as solvents	23	Soil, sand, clay including dredging spoils
6	Halogenated organic substances not employed as solvents	24	Non-cyanidic tempering salts
7	Tempering salts containing cyanides	25	Metallic dust, powder
8	Mineral oils and oily substances, [e.g., cutting sludges]	26	Spent catalyst materials
9	Oil/water, hydrocarbon/water mixtures, emulsions	27	Liquids or sludges containing metals
10	Substances containing PCBs and/or PCTs, [e.g., dielectrics]	28	Residue from pollution control operations, [e.g., baghouse dusts, etc.] except (29) and (30)
11	Tarry materials arising from refining, distillation and any pyrolytic treatment, [e.g., still bottoms]	29	Scrubber sludges
12	Inks, dyes, pigments, paints, laquers, varnish	30	Sludges from water purification plants and wastewater treatment plants
13	Resins, latex, plasticizers, glues/adhesives	31	Decarbonization residue
14	Chemical substances arising from research and development or teaching activities which are not identified and/or are new and whose effects on man and/or the environment are not known, [e.g., laboratory residues]	32	Ion-exchange column residue
15	Pyrotechnics and other explosive materials	33	Sewage sludges
16	Photographic chemicals and processing materials	34	Wastewaters not otherwise taken into account within Table 3.5
17	Any material contaminated with any congener of polychlorinated dibenzo-furan	35	Residue from cleaning of tanks and/or equipment
18	Any material contaminated with any congener of polychlorinated dibenzo-p-dioxin	36	Contaminated equipment
		37	Contaminated containers [e.g., packaging, gas cylinders, etc.] whose contents included one or more of the constituents listed in Table 3.5
		38	Batteries and other electrical cells
		39	Vegetable oils
		40	Materials which have been segregated from households and which also exhibit any of the characteristics listed in Table 3.5
		41	Any other wastes which contain any of the constituents listed in Table 3.5

Source: Yakovitz OECD, 1988

Table 3.6

Agriculture--Farming Industry

- A100 Agriculture, forest management
 - A101 Cultivation
 - A102 Animal husbandry
 - A103 Forest management and forest exploitation (lumbering)
- A110 Animal and vegetable products from the food sector
 - A111 Meat industry, slaughterhouses, butchery
 - A112 Dairy industry
 - A113 Animal and vegetable oil and grease industry
 - A114 Sugar industry
 - A115 Others
- A120 Drink industry
 - A121 Distillation of alcohol and spirits
 - A122 Brewing of beer
 - A123 Manufacture of other drinks
- A130 Manufacture of animal feed

Energy

- A150 Coal industry
 - A151 Production and preparation of coal and coal products
 - A152 Coking operations
- A160 Petroleum industry
 - A161 Extraction of petroleum and natural gas
 - A162 Petroleum refining
 - A163 Storage of petroleum and products derived from refining of natural gas
- A170 Production of electricity
 - A171 Central thermal facilities
 - A172 Central hydraulic facilities
 - A173 Central nuclear facilities
 - A174 Other central electricity facilities
- A180 Production of water

Metallurgy--Mechanical and Electrical Construction

- A200 Extraction of metallic ores
- A210 Ferrous metallurgy
 - A211 Cast iron production (coke oven)
 - A212 Raw steel production (pig iron)
 - A213 Primary steel transformation (rolling mills)
- A220 Non-ferrous metallurgy
 - A221 Production of alumina
 - A222 Aluminium metallurgy
 - A223 Metallurgy of lead and zinc
 - A224 Metallurgy of precious metals
 - A225 Metallurgy of other non-ferrous metals
 - A226 Ferro-alloy industry
 - A227 Manufacture of electrodes
- A230 Foundry and metalworking operations
 - A231 Ferrous metal foundries
 - A232 Non-ferrous metal foundries
 - A233 Metalworking (not including machining)
- A240 Mechanical, electrical and electronic construction
 - A241 Machining
 - A242 Thermal treatment
 - A243 Surface treatment
 - A244 Application of paint
 - A245 Assembly, wiring
 - A246 Production of batteries and dry cells
 - A247 Production of electrical wires and cables (cladding, plating, insulation)
 - A248 Production of electronic components

Non-Metallic Minerals --
Construction Materials --
Ceramics--Glass

- A250 Mining and quarrying of non-metallic minerals
- A270 Construction materials, ceramics, glass
 - A271 Production of lime, cement and plaster
 - A272 Fabrication of ceramic products
 - A273 Fabrication of products containing asbestos-cement
 - A274 Production of other construction materials
 - A275 Glass industry
- A280 Building, building sites, landscaping

Primary Chemical Industry

- A300 Production of primary chemicals and chemical feedstocks
 - A301 Chlorine industry
 - A351 Fertilizer fabrication
 - A401 Other manufacturing generators of primary inorganic industrial chemicals
 - A451 Petroleum and coal industry
 - A501 Manufacture of basic plastic materials
 - A551 Other primary organic chemical manufacture
- A601 Chemical treatment of fats; fabrication of basic substances for detergents
- A651 Fabrication of pharmaceuticals, pesticides, biocides, weed killers
- A699 Other manufacture of finished chemicals

Industries Producing Products
Based upon Primary Chemicals

- A700 Production of inks, varnish, paints, glues
 - A701 Production of ink
 - A702 Production of paint
 - A703 Production of varnish
 - A704 Production of glue
- A710 Fabrication of photographic products
 - A711 Production of photosensitive plates
 - A712 Fabrication of products for photographic treatments
- A720 Perfume industry and fabrication of soap and detergent products
 - A721 Fabrication of soap products
 - A722 Fabrication of detergent products
 - A723 Fabrication of perfume products
- A730 Finished rubber and plastic materials
 - A731 Rubber industry
 - A732 Finished plastic materials
- A740 Fabrication of products based upon asbestos
- A750 Production of powders and explosives

Textiles and Leathers--Various
Wood Based and Furniture
Industries

- A760 Textile and clothing industry
 - A761 Combing and carding of textile fibres
 - A762 Threading, spinning, weaving
 - A763 Bleaching, dyeing, printing
 - A764 Clothing manufacture
- A770 Leather and hide industry
 - A771 Tanneries, tanning
 - A772 Fur trade
 - A773 Manufacture of shoes and other leather products
- A780 Wood and furniture industry
 - A781 Sawmills, production of wood panels
 - A782 Manufacture of wood and furniture products
- A790 Various related industries

Table 3.6 continued

Paper -- Cardboard -- Printing

- A800 Paper and cardboard industry
- A801 Fabrication of paper pulp
- A802 Manufacture of paper and cardboard
- A803 Finished goods of paper and cardboard
- A810 Printing, publishing, photographic laboratories
- A811 Printing, publishing
- A812 Photographic laboratories

Commercial Services

- A820 Laundries, bleaching services, dyers
- A830 Business enterprise
- A840 Transport, automobile dealers and repair facilities
- A841 Automobile dealers and automobile repair facilities
- A842 Transportation
- A850 Hotels, cafés, restaurants

General Services

- A860 Health
- A861 Health (hospitals, medical centres, nursing homes, laboratories)
- A870 Research
- A871 Research (including research laboratories)
- A880 Administrative activities, offices

Households

- A890 Households

Pollution Control -- Waste Disposal

- A900 Cleaning and maintenance of public areas
- A910 Urban water treatment facilities
- A920 Urban waste treatment
- A930 Treatment of industrial effluents and wastes
- A931 Incineration
- A932 Physico-chemical treatment
- A933 Biological treatment
- A934 Solidification of wastes
- A935 Collection and/or pretreatment of wastes
- A936 Landbased disposal above, on or below the surface

Regeneration -- Recovery

- A940 Regeneration activities
- A941 Regeneration of oils
- A942 Regeneration of solvents
- A943 Regeneration of ion exchange resins
- A950 Recovery activities

Source: Yakovitz OECD, 1988

new directive on hazardous waste replaces the definition of Directive 78/319/EEC so as to harmonize the member states' definitions by utilizing the International Waste Identification Code (IWIC).

The United Nations Economic Commission for Europe (UNECE) provides a more articulate definition of hazardous waste:

Wastes which, due to their toxic, infectious, radioactive, flammable, etc. character, pose a substantial actual or potential hazard to human health or living organisms. Hazardous waste is potentially damaging to the environment and must therefore be controlled. Hazardous waste can present either short-term acute hazards or long-term environmental hazards. Waste with these properties may arise as by-products, process residues, spent reaction media, contaminated plant, or equipment from either manufacturing operations or the treatment of toxic substances, and from the discarding of manufacturing products. For the purpose of this definition, hazardous wastes comprise for each country all those materials and products which are considered to be hazardous in accordance with that country's practices.⁵

Regulatory bodies in each European country have adopted different approaches to defining hazardous waste. They generally specify the categories of waste that should be considered hazardous; the substances (or concentration of substances) that indicate a hazard; or the properties (chemical, physical and toxicological) of substances that are of concern.⁶ These differing definitions are symptomatic of the fact that hazardous waste definitions respond to different economic, political, and social relationships in different national contexts. The difficulty of agreeing on a single definition is especially evident in the international arena, in that no two countries, economic and environmental organizations, or international institutions share the same list. The attempts of the OECD and the United Nations to standardize these definitions and establish an

5. United Nations Economic Commission for Europe (UNECE) classification, CES/638/11.4.89.

6. See Chapter 1.

international waste classification system have also encountered enormous difficulties.

The disagreement among countries concerning the definition of hazardous waste and the classification system to be adopted can be ascribed to the different approaches and focus of national policies. In fact, countries willing to reduce hazardous waste at the source have adopted the most comprehensive definition of hazardous waste and classify waste by types of waste streams and their sources. On the other hand, countries focusing their policies on improved treatment and disposal of hazardous waste generally specify the types and concentrations of substances and the procedures to assess their hazard.

Currently, the harmonization of waste definitions across EC member states and the production of a common waste nomenclature is being undertaken by the European Commission (DGXI) in order to put into effect the provisions established with Directive 91/156/EEC and to create the conditions for the harmonization of waste management policies across the member states. Aware of existing disagreements, the Commission is developing a European waste catalog that allows for cross-referencing existing lists for monitoring and reporting purposes without imposing a unified classification system across countries. In spite of that, member states disagree on the cross-referencing to be adopted. In fact, it is clear that the different approaches -- whether focusing on the manufacturing processes generating hazardous waste, on hazardous waste streams or on hazardous substances -- imply different views regarding the role and focus of the EC hazardous waste policy.

Environmental impacts

The controversy over different management methods rests on the interest groups' different perceptions of the risks of handling hazardous waste throughout its life-cycle. Each step in the life cycle of hazardous waste is in fact

a point of potential emission, as both human action and natural processes can disperse hazardous chemicals into the environment. The uncertainty surrounding the environmental and health effects of hazardous substances adds to this controversy, making it impossible to estimate the costs and benefits of the different waste management options.

The risks to public health and the environment from different waste streams depend on both the potential hazard of particular substances and the methods for handling them from production to final disposal. Hazardous substances pose short-term and long-term environmental and health risks depending on their physical, chemical and toxic properties. These substances may persist and accumulate in the environment because they have no immediate biological or chemical/physical degrading agents. Certain substances are highly mobile and easily migrate into the environment. Hazardous substances are potentially toxic, flammable, and explosive and thus pose acute and chronic hazards to the health of humans and other living organisms.

At hazardous waste sites, hazardous substances can be dispersed into the environment by the emissions from treatment facilities as well as by the leaching of toxic substances from temporary storage and permanent disposal sites. While some processes that lead to environmental contamination are well understood, others are still unclear. Experts in the scientific community disagree on the variables and measurement methods to be considered for assessing the environmental impact of alternative methods for the management of hazardous waste.

The lack of reliable data makes it impossible to quantify the global environmental impact of current waste management activities in Europe. However some indications of the dimension of the problems can be derived from the available data on emissions and contamination of soil and ground water reported by national agencies. The Dutch Ministry of the Environment, for

example, estimates that incineration plants are responsible for 80% of the dioxines, 60% of the hydrochloric acid and 53% of the mercury emitted into the air in the Netherlands (Figure 3.1).⁷ The contamination of soil and groundwater by heavy metals, cyanide, aromatics, chlorine hydrocarbons, and other toxic substances is also found at old waste sites (Figure 3.2). In Europe, many thousands of sites are reported as contaminated due to improper disposal of waste (Table 3.7). At these sites there are serious risks of contamination of the soil and groundwater and of direct health hazards for the population and the environment exposed.

Control options

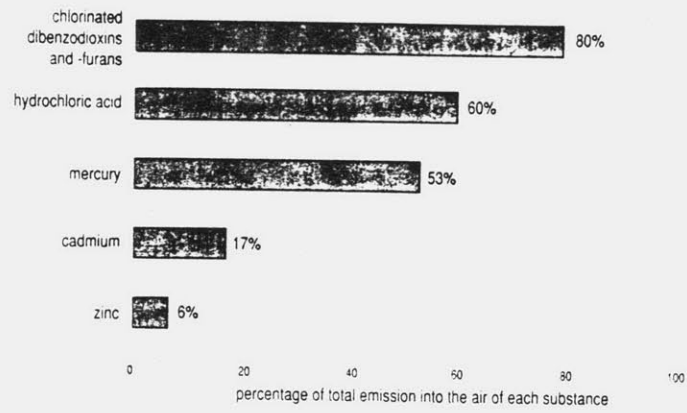
Hazardous waste prevention, increased recycling, and proper waste treatment and disposal can be achieved by measures aimed at controlling each decision point in the hazardous waste life cycle. They include effect-oriented measures, emission-oriented measures, source-oriented measures, and substance-oriented measures. Examples of those different approaches are illustrated in Table 3.8)

Effect-oriented measures are aimed at controlling the risk for public health and the environment due to existing or potential contamination of environmental media by improper practices at hazardous waste treatment and disposal facilities. *Emission-oriented measures* are aimed at controlling emissions of toxic substances from industrial processes as well as from hazardous waste treatment and disposal plants. These measures do not require changes in raw material, production processes, and product design. They do, however, require the adoption of add-on technologies in order to satisfy specific emission standards. *Source-oriented measures* are aimed at minimizing hazardous waste

7. Ministry of Housing, Physical Planning and Environment, 1991, *Essential Environmental Information. The Netherlands*. Op. cit., p. 102, Fig. 4.6.3.

Figure 3.1

Emissions by Waste Incinerating plants in the Netherlands

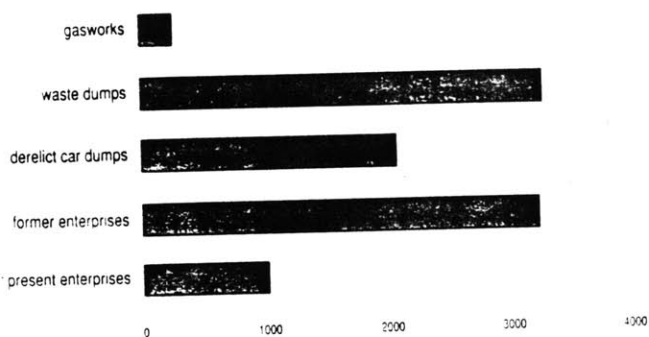


Source: VROM, 1991

Figure 3.2

Estimated Number of Clean-up Sites
in the Netherlands

Relation sources/substances



Explanation: The figure shows only priority 1 sites. Over 100,000 sites were given priority 2.

Branch	Polluting substance							Total
	Heavy metals	Cyanide	Aromatics	Aliph.Chl. hydrocarbons	Pesticides	Petrol Engine oil	Other	
Agriculture	46	-	1	-	26	41	22	136
Chem. Ind.	97	1	20	19	12	49	91	289
Building	23	-	-	-	-	12	8	43
Metal ind.	206	12	5	37	-	72	25	357
Gasworks	36	75	5	2	-	10	100	228
Traffic	331	2	26	8	1	642	168	1178
Other	1446	26	48	135	16	806		3287
Total	2185	116	105	201	55	1632	1224	5518

Explanation: The table shows the number of cases per branch of industry in which the groups of substances listed were found. A selection was made of branches of industry and groups of substances; therefore the figures for 'Other' are relatively high.

Source: VROM, 1991

Table 3.7

Conataminated Sites

	B	D	F	G	Gr	I	It	L	N	P	S	UK
Estimated potential of sites		3,115	800	35,000			5,433		6,060	>1,800	94	300
Remedial Action required	74	501	82	5,400					1,460	69		
Investigation and monitoring required	11	2,610	371	22,600	> 100		800	75				
No action required				22,000				54				
Reorganized closed sites	248		107					12				

Source: EC, 1992

Table 3.8

Control Options

Approaches	Measures	Examples of regulations
Effect-oriented measures	<ul style="list-style-type: none"> - Set limits on ambient concentration - Clean up of contaminated sites 	<ul style="list-style-type: none"> * Ambient quality Standards * Maximum Risk Limits * Clean up regulation * Strict liability
Emission-oriented measures	<ul style="list-style-type: none"> - Restriction on emissions from incineration - Restriction on landfill for hazardous substances - Require adoption of Best Available Technologies for waste treatment - Restrictions on movement of hazardous waste 	<ul style="list-style-type: none"> * Emission standards * Performance standards * Specifications for landfill * Integrated pollution control permit * Best Available Technology * Manifest system for waste transport * Transfrontier movement regulations * Strict liability

Source-oriented measures	<ul style="list-style-type: none"> - Set reduction targets for priority waste streams - Require adoption of Best Available Technologies for production processes - Restrictions on products and packaging materials - Eco-labelling of products 	<ul style="list-style-type: none"> * Priority waste streams lists * Waste streams reduction implementation plans * Best Available Technology * Regulations on products -labelling -disposal * Regulation on packaging -products -waste * Eco-labelling
Substance-oriented measures	<ul style="list-style-type: none"> - Ban or phase-out of certain hazardous substances - Restrictions on the use of certain substances in manufacturing processes 	<ul style="list-style-type: none"> * International conventions banning certain substances (i.e. CFCs) * Phase-out of toxic substances from packaging materials

generation by explicit regulation of materials, industrial processes and products, and by requirements for reuse and recycling. *Substance-oriented measures* restrict or phase out the use of certain hazardous chemicals in the manufacturing processes.

Different views emerge in the process of choosing the focus and approach of measures for hazardous waste minimization. Advocates and opponents of regulatory approaches sharply disagree on the steps that ought to be taken to overcome past policy failure and to encourage the minimization of hazardous waste. For advocates of minimizing waste at its source, existing policies fail to do so because they focus on emission control rather than source reduction. In their view, explicit measures are needed that prescribe reduction targets and prohibit the use of specific hazardous substances.

Opponents of regulatory approaches to hazardous waste minimization believe that hazardous waste policies have failed because inadequate incentives and assistance have been provided to industries to help them cope with the economic and technical difficulties of developing and implementing hazardous waste minimization strategies. In this view, the minimization of hazardous waste does not justify additional regulations and additional implementation costs, but does require more public economic aid as well as improved technical assistance.

The results of my case studies suggest that regulatory approaches and control systems by themselves do not explain the success or failure that different nations have had in implementing hazardous waste minimization. They do show, instead, different tradeoffs made by interest groups in the various European countries on how environmental vs. economic priorities and environmental risks vs. economic costs ought to be balanced and on how the costs of minimizing hazardous waste must be distributed across different groups, geographical regions and human generations.

The utopia of total control

Hazardous waste minimization policies in Europe rely on the mechanisms of internalizing environmental costs that were put in force as countries adopted stringent standards for the management of hazardous waste. These policies rest on the assumption that effective control of the hazardous waste life-cycle is attainable and that stringent standards on the management of hazardous waste will inevitably lead industries to produce less hazardous waste. This assumption, however, is contradicted by the vast uncertainty inherent in hazardous waste issues -- uncertainty as to whether a certain waste poses a hazard, as to whether it is a waste, as to how much there is of it, and as to where and how safe is safe disposal.⁸ This uncertainty leads to high controversy.

Thompson emphasizes that the uncertainty inherent in the hazardous waste issues is a structural problem. He contends that "we are in the realm of things that have no value, or that have negative value, or that have some value to some people and negative value to still other people," and where effective control by the market or by central planning is simply not attainable.⁹ Effective control, Thompson argues, "is attainable in the realm of things that have value (and not just value, but value to everyone)", then "the market or the central plan can operate in such a way as to ensure that things go where they are intended to go, and tabs can be kept on the quantity of things and location." But hazardous wastes change their value as they move across the various stages of their life-cycle and across different countries.

The controversies and uncertainties surrounding hazardous waste issues have important consequences upon the relationship between regulation and

8. Michael Thompson, 1990, *op. cit.*

9. Michael Thompson, 1990, *op. cit.*, pp. 121-122.

implementation.¹⁰ The conflicts among the various interests that are excluded from the policy-making process simply reemerge during implementation and impede the achievement of policy objectives. Both, the diversified range of regulated actors between the source and final disposal and the multiple points where compliance with regulation is required, make the implementation of hazardous waste policies likely to fail unless there is agreement among the different agents on the goals to pursue.

Current hazardous waste minimization policies have failed because the parties that have relevant interest in the decisions about minimizing hazardous waste were excluded from the policy-making process. To achieve significant hazardous waste reduction targets will require that conflicts among interests are reconciled and choices made through cooperation among all the participants in the problem. These choices cannot be avoided by relying on one single rationality, either the market or the central plan. Instead, since different views and rationalities are part of the problem -- in that their social and economic groups' interests, values and choices are the cause of the problem -- then these same interests, values, and choices are crucial to finding the solution.

3.2 Actors and interests

Industry

The role of different industries in the hazardous waste policy arena varies according to the specific concerns of different industrial sectors and branches. Moreover it depends on how essential the various hazardous substances are to

10. Brian Wynne, 1987, *Risk Management and Hazardous Waste: Implementation and Dialectics of Credibility*. Springer Verlag.

the manufacturing processes and the availability of non-hazardous substitutes. The chemical industry is one of the principal actors involved in hazardous waste production. Other important actors, ranked on the basis of their hazardous waste production, include primary metal and metal-finishing, petroleum, rubber and plastic, mechanical engineering, and transportation equipment.

For industry, non-recoverable production process residuals have negative economic value in that the producers must pay to eliminate them. Together with keeping the overall cost of production low and achieving full efficiency, industries have an interest in reducing the cost of hazardous waste management to a minimum. Therefore, among the available options for hazardous waste management, they are likely to opt for the most competitive one. And, given the current regulatory framework, hazardous waste minimization is still not the most competitive approach. Export of hazardous waste, even when it implies paying to transport those wastes for thousands of miles, is for industry the most economical answer to the problem of managing hazardous waste.

The interest of industry in waste minimization arises, instead, when the efficiency of industrial processes can be improved by replacing hazardous substances or technologies, or simply by recovering waste streams. Industry is increasingly looking for opportunities to reduce hazardous waste, while achieving substantial process optimization.¹¹ Major chemical industries such as the German BASF, the Dutch Shell, and the UK ICI have developed specific strategies of waste minimization driven by explicit economic motivations. Shell, for example, had already recognized in 1984 that any change in a process leading to minimization of the quantities of waste can lead to savings in materials and energy and ultimately in costs for treatment and disposal.¹²

11. Huisingsh et al., 1986, op cit.

12. Shell International Petroleum Company Ltd., "Environmental Briefs-Waste Management, December, 1984.

At the European level, the European Chemical Industry Council¹³ (ECIC), which represents 15 national federations of chemical industries in Western Europe and accounts for about 30% of the world's chemical production, has recently issued its own guidelines for environmental protection and waste minimization.¹⁴ CEFIC recognizes waste minimization as a strategic approach for protecting the environment as well as for reducing waste management costs and improving efficiency. Accordingly, it recommends taking "all economically and technically justifiable measures to minimize generation of waste, through process optimization and re-design."¹⁵

Another important interest of industry is in improving its public image as being environmentally safe and attentive to environmental concerns. As concerns hazardous waste management, it is especially interested in reestablishing its credibility with the populations affected by old contaminated sites and with non-governmental organizations (NGOs) and local action groups. The opposition of these groups, in fact, prevents the siting of new hazardous waste facilities. Furthermore, the increasing role of environmental issues in influencing national economic policy has pressed industry to develop a strategy toward environmental protection.¹⁶

As already suggested, industry opposes regulations that prescribe either hazardous waste minimization targets or the phase-out of hazardous substances. It also opposes tightened hazardous waste management standards and increased control on transboundary movement of hazardous waste. A traditional regulatory

13. The title of European Chemical Industry Council (ECIC) has recently replaced the previous name of the organization, which was European Federation of Chemical Industries (CEFIC).

14. Conseil Europeen des Federations de l'industrie chimique (CEFIC), 1987, "Industrial Waste Management: A CEFIC approach to the issue." Brussels, CEFIC.

15. CEFIC, 1987, *op. cit.*

16. WICEM II Second World Industry Conference on Environmental Management, Rotterdam, 10-12 May 1991. Summaries of Working Sessions.

approach, industry argues, would be neither practicable, given current technologies, nor efficient, in that it would impede the search for better and less costly environmental solutions. Rather, industry proposes that in order to face the technical and economic obstacles of converting industrial processes, economic incentives are the most appropriate instrument for achieving the minimization of hazardous waste.

In Europe, industry exerts a significant influence on national government through the industrial sectoral organizations and the national federations of enterprise, which in most European countries are systematically consulted. In some countries, such as the Netherlands, industrial organizations sit on governmental advisory committees, while in other countries, such as Germany, the UK and Italy, they are informally consulted on environmental regulations. These two approaches have different consequences as regard the influence that industry exerts on national governments. Interestingly, in the Netherlands industry participates on advisory committees, together with other interest groups, in order to explore alternative measures and set implementation plans. In Italy, Germany and the UK, governments consult with industrial associations primarily to test their responses and adjust the requirements and deadlines of environmental regulations. The influence of industry in these latter contexts therefore has been primarily to prevent governments from enacting hazardous waste regulations.

National governments

In line with the European directives on hazardous wastes, European national governments have adopted hazardous waste regulations and established regulatory frameworks to confront the problems arising from the increasing production of hazardous waste. The different approaches adopted by the European governments can be traced to different tradeoffs among interest groups within given national contexts, as well as to the different regulatory philosophies

and institutional settings.¹⁷

All western European countries have opted to promote hazardous waste minimization by means of increasing hazardous waste management standards, as opposed to adopting regulatory measures that prescribe waste minimization. However, significant differences between national policies can be found if we analyze the ways that national governments pursue hazardous waste minimization and the actual impact of the different approaches. Differences across European countries as to the definition of hazardous waste, the regulatory approaches, the stringency of standards, the centralization of regulatory authorities, the public access to rule-making, and the ways that public agencies deal with controversies: all these have important consequences for the implementation of policies aimed at minimizing hazardous waste.

The UK, for example, which relies on an extremely decentralized and discretionary system, and on the voluntary compliance of industry, disposes of more than 70% of its hazardous waste in landfills. On the other hand, Germany and the Netherlands, which have adopted comprehensive hazardous waste control systems and rely on stringent standards, have obtained substantial results in shifting from disposal to treatment and incineration practices. None of them, however, has achieved significant results in minimizing hazardous waste through waste prevention.

In principle, all EC member states oppose either a ban on hazardous substances or a ban on the transfrontier movement of hazardous waste. They also have expressed, thus far, a similar preference to not adopt a regulatory approach to waste prevention because of the enormous implementation problems and costs that such an approach would face. However, policy-makers disagree as to what steps must be taken to meet goals for hazardous waste minimization. Some

17. See chapter 1, *National policy and regulatory systems*.

countries are considering adopting more direct hazardous waste minimization measures to confront the increasing production of hazardous waste. The Netherlands has established specific targets to considerably reduce the amount of priority waste streams; in conjunction with industry, it is drawing up implementation plans to cut down or phase out the use of certain hazardous substances in manufacturing processes, products, and packaging materials. In contrast, the UK has strengthened standards for the management of hazardous waste, but is opposed to adopting more stringent measures for hazardous waste prevention.

Local governments

In Europe, local authorities -- which include states, counties, provinces, regions, and municipalities, depending on different national institutional settings -- are in charge of implementing hazardous waste regulations adopted at the national level. Therefore, they play a key role in the hazardous waste policy process. Their perspective on hazardous waste issues can vary from that of the national government because they are responsible for enforcing standards, monitoring compliance, and implementing the clean up of old hazardous waste sites, as well as for siting new hazardous waste facilities.

Although the range of responsibilities accorded to local governments varies from one country to another, their duties typically include the siting of hazardous waste facilities to provide the capacity for hazardous waste treatment and disposal. The enormous difficulties that local governments face in accomplishing this goal have put them in a critical position and have created increasing tension between the national and local authorities.

Different patterns of conflicts between the central and local levels of government can be traced to the varying levels of centralization of the regulatory systems, and the different levels of local government involvement in drafting

hazardous waste regulations across EC countries. Two extreme examples are Italy and the UK. In Italy, hazardous waste regulations are set at the central level of government and are implemented by the regions, which develop regional hazardous waste plans. Regional governments are in charge of siting hazardous waste facilities in compliance with the recent national emergency measures. If they fail in siting these facilities, national regulations empower the government to impose the site. Thus, as demonstrated in the Tuscany case study (see Chapter 2), regional governments are placed in a difficult position: they must mediate between the opposition of local communities and municipalities to the siting of hazardous waste facilities in their territory, and the pressure of the national government to implement national regulations.

At the other extreme, in the UK the extensive decentralization of public authorities in charge of implementing and monitoring national regulations has led to great diversity in the levels of hazardous waste control across counties and different levels of compliance with the national regulatory framework.

The Netherlands and Germany rely on centralized regulatory systems, though the Dutch provinces and German states that are in charge of implementation are involved to different degrees in the policy formulation process. The Dutch National Environmental Policy Plan, for example, calls for "an efficient sharing of tasks between the levels of government involved" and establishes close cooperation with the provinces and municipalities.¹⁸ In Germany cooperation between the federal government and the states is carried out through the Bundesrat (second chamber) which must be consulted on, and must consent to, all legislation affecting the competence of states.

18. Ministry of Housing, Physical Planning and Environment, 1990, "National Environmental Policy Plan Plus (NEPP-P)," p. 66.

Citizens

Citizens' interests can be analyzed according to different social roles they play as consumers, as members of a local community, and as members of the national community. As consumers, citizens determine the demand for a certain type and quality of products. Consequently, increased public concern over the environmental and health threats posed by toxic substances is a new dimension to which manufacturers must respond in designing their products. Consumer organizations in Europe are increasingly urging the national governments to adopt more stringent quality standards and labeling systems for consumer products. On the other hand, lifestyle patterns in European countries show increasingly individualistic behaviors which have higher impacts on the environment.

As members of local communities, citizens have played a significant role in pointing out the need for stricter hazardous waste regulations by obstructing the siting of hazardous waste facilities. Such opposition by local communities has been characterized by several policy analysts as the Not-In-My-Backyard (NIMBY) syndrome, to emphasize the primary interest of local communities in keeping their own neighborhood clean. In Europe, however, local citizens groups are often connected through national networks in order to influence national decision-making that is likely to affect local communities. Therefore, the impact of public opposition to the siting of hazardous waste facilities is not confined to the siting process. Instead, public opposition has a significant effect on national hazardous waste policies.

In addition, the increased memberships of many national environmental organizations and associations and the success of green parties in several European countries show that a vast proportion of citizens actively support environmental protection. Moreover, a recent survey in Europe gives high priority to environmental protection over economic growth, though there are

differences in perceptions across European countries (Figure 3.3).¹⁹

Environmental organizations

The environmental movement is not homogeneous in its organizational structure nor in the goals and values it seeks to maximize.²⁰ Environmental organizations in Europe range from local action groups to national and international organizations. They also vary as to the focus of their action and the strategies they adopt. The ingress of environmental groups into the national parliaments -- Germany (1983), Belgium (1981), and Italy (1987) -- and into the European Parliament (1984) has introduced a new dimension to the multi-faceted characteristics of environmentalism.

Environmental organizations have played a crucial role in raising hazardous waste issues in Europe, and they play an important role in pressuring national governments and industry toward minimizing hazardous waste. However, their influence on hazardous waste policies varies according to the scope of their memberships and the focus of their action. Local environmental action groups play a major role in monitoring contamination from old hazardous waste sites and in promoting opposition to the siting of new hazardous waste facilities. On the other hand, national organizations act on a broader perspective, targeting industrial sectors and governmental agencies in order to urge them toward the prevention of hazardous waste.

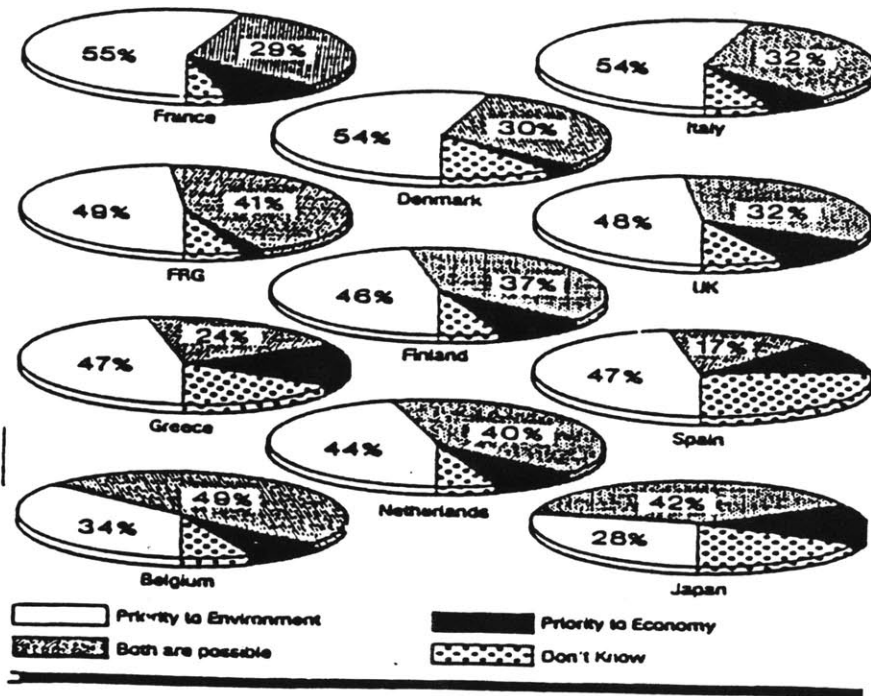
Environmentalists say that there is no such thing as safe disposal, or

19. OECD, 1987, *OECD Environmental Data Compendium*. Paris, OECD.

20. Helen M. Ingram and Dean E. Mann, 1989, "Interest Groups and Environmental Policy," in J.P. Lester (Editor), *Environmental Politics and Policy*. Duke University Press, pp. 135-157.

Figure 3.3

Perceptions of Environmental Protection versus Economic Growth



Source: OECD, 1987.

proven safe incineration of hazardous waste.²¹ They advocate that the solution for hazardous waste issues is to avoid hazardous waste at its source, though their arguments vary across different groups and organizations. So, they oppose new hazardous waste facilities which would pose increased risks for the population and the environment and call for the phase-out and clean-up of existing ones.²² Greenpeace International claims in a recent report on hazardous waste incineration technology that incinerators transform hazardous waste into thousands of new chemicals which lead to increases in cancer rates, respiratory ailments, and reproductive abnormalities. The report indicates that an "average-sized" incinerator releases 90 tons of metals per year and 300 tons of products of incomplete combustion (PICs). On the basis of this report, Greenpeace International recommends that national governments adopt a moratorium on the construction of new hazardous waste incinerators and establish a phase-out of all existing incinerators.

Environmentalists do recognize that the shift to clean technologies and clean products requires time and economic resources. Thus they accept chemical or biological detoxification and interim storage as short-term solutions for those hazardous wastes that have already been produced.²³ However, they argue that industry will not adopt minimization strategies until national governments introduce stringent measures to impose hazardous waste reduction and recycling on firms. These measures include the regulation of certain industrial waste streams, and a tax on hazardous waste production and toxic products, as well as the phase-out of hazardous substances from manufacturing processes.

21. Greenpeace International, 1990, "The Need for a European Waste Prevention Strategy." Paper by Ernest R. Klatte for the STOA Workshop on "Hazardous Waste Prevention," 25-26 January, 1990, Brussels.

22. Interviews with: Renata Ingraio, head of the Italian environmental organization Lega per l' Ambiente; Gianni Tamino, representative of the Green Party in the Italian Parliament; Duccio Bianchi, in charge of hazardous waste policies at the Italian Research Institute Ambiente Italia; and Christoph Ewen, in charge of hazardous waste issues at the German Oeko-institut.

23. Greenpeace, 1990, *op. cit.*, p. 7.

3.3 Conflicts and tradeoffs

The conflicts among the various interests involved in hazardous waste issues are reflected in the policy debate regarding the steps to be taken to minimize hazardous waste. Advocates and opponents of a regulatory approach to waste minimization hold different priorities in the process of balancing environmental vs. economic considerations. There are also different perceptions as to the environmental risk vs. economic cost among different interest groups. Environmental risks, as well as the measures to prevent them, have some economic cost, the distribution of which among social groups, regions and human generations depends on the weight of distributional and ethical considerations in the policy-making process.

Environment vs. development

The environment versus development tradeoff determines to what extent hazardous waste can be prevented given current social, economic and technological constraints. Different groups disagree on the factors and the time-frame to be considered in making this trade-off. In the short term, the costs of environmental protection are considered to slow down economic development. However, in the long run protecting the environment has been shown to reduce costs and to improve both the efficiency of resource use and the quality of development.

The debate over environmentally sustainable development is central to hazardous waste policy choices in that the concept of sustainability does not merely imply greater consideration of environmental variables in policy-making - it also implies that environmental and economic goals are essentially interconnected. So the solutions cannot be found merely by trading off interests against each other. There is in fact a common interest involved if we consider the mutual dependence of environmental quality and socio-economic development.

The World Commission on Environment and Development has emphasized this interdependence in its report *Our Common Future*:

Economic and ecological concerns are not necessarily in opposition. For example, policies that conserve the quality of agricultural land and protect forests improve the long-term prospects for agricultural development. An increase in the efficiency of energy and material use serves ecological purposes but can also reduce the costs. But the compatibility of environmental and economic objectives is often lost in the pursuit of individual and group gains, with little regard for the impacts on others, with a blind faith in science's ability to find solutions, and in ignorance of the distant consequences of today's decision. Institutional rigidities add to this myopia.²⁴

By re-defining the relationships between environment and growth, the concept of sustainable development has important consequences on the choice of appropriate environmental policies and control measures. In order to satisfy the criteria of sustainability, development must "meet the needs of the present without compromising the ability of future generations to meet their own needs."²⁵ It implies, for example, that hazardous waste issues can be best be prevented at the source by avoiding their production. It also implies closing substance cycles by reuse and recycling of waste products as secondary materials. How much reduction of hazardous waste can be achieved and in which time frame are two central themes of the hazardous waste controversy.

Advocates of a regulatory approach to waste prevention argue that there is actually a much higher potential for hazardous waste minimization than would now appear on the basis of current technological and economic feasibility. They claim that regulation has been shown to induce invention, innovation, and

24. The World Commission on Environment and Development, 1987, *Our Common Future*. Oxford University Press, Oxford, UK, p. 62.

25. WCED, op. cit., p. 43.

diffusion of new technologies throughout industry.²⁶ In contrast, opponents of hazardous waste prevention through regulatory measures argue that regulations will instead obstruct innovation by imposing on firms fixed deadlines which would prevent industry from exploring and experimenting with new technological solutions.

Risks vs. Costs

There is still much uncertainty concerning the environmental and health risks of chemical substances. The uncertainty about the synergistic and cumulative effects of these substances is far greater due to the increasing number of chemicals that are entering the environment.

The effects of hazardous substances have environmental, social and economic costs. On the other hand the adoption and implementation of control measures also cost money. Policy makers disagree on how to evaluate and balance the risks and costs associated with hazardous waste policy options. Moreover, there are different perceptions of risk across different groups. The choice among different reduction options implies balancing environmental benefits and economic costs.

Different parties have different views on measuring the overall risks and costs of different options. At one extreme, environmental organizations argue that current estimates on the costs of waste management do not reflect the overall costs of environmental and health effects due to the dispersion of the hazardous substances of disposal and the treatment of hazardous waste. Instead, they argue that the costs of waste reduction measures are overestimated since they do not take into account the savings in the cost of regulatory compliance,

26. N.A. Ashford and G.R. Heaton, 1983, "Regulation and Technological Innovation in the Chemical Industry." *Law and Contemporary Problems*, Vol. 46, pp. 109-154. See also Caldart and Ryan, 1985, op. cit., pp. 314-316.

for both generators and regulators. In contrast, industry claims that, given current technological development, waste reduction imposes enormous costs and uncertainty on the industries that need to search for substitutes.

Distribution of costs

Equity issues are involved in hazardous waste policy-making since some countries and some social groups, as well as future generations, must suffer because of hazardous waste, while they do not share the economic benefits. Moreover, the environmental damage of improper hazardous waste management can compromise the chances of economic development for these countries as well as the welfare of future generations.

According to the Dutch NEPP, the costs of deterioration in environmental quality are too often "rolled off to other scale levels, to other groups in society or to future generations," leading to the development of "environmental debt": the present generation "borrows" environmental resources from future generations and other countries. As regards hazardous waste management, the roll-off mechanism occurs through the contamination of land and ground water, for which the costs of clean-up are prohibitive; in most cases the impact is irreversible. These mechanisms also occur as hazardous waste is exported to less developed countries where the chances of its being properly managed are far less.

3.4 Policy Options

The increasing production of hazardous waste, despite efforts to achieve minimization, poses increasing pressure on the environment. Reported estimates of increasing hazardous waste do not allow us to extrapolate accurate information on the overall impact of present trends. However, the OECD

estimates that OECD Europe alone generates 300 million tons per year of industrial waste, of which ten to fifteen percent is legally defined as hazardous waste. The rate of increase in production of these wastes in 1985-89 was nearly 2 percent per year: that is a higher rate than the increase in GNP.

Worldwide attention to hazardous waste issues has been called by the Preparatory Committee for the 1992 United Nations Conference on Environment and Development (UNCED) which urges the "development of an international strategy for environmentally sound management of hazardous wastes, giving priority to waste reduction at source."²⁷ In Europe, environmental organizations are urging public agencies to face the gap between the intent and actual effects of their hazardous waste policies.

In this section, I analyze five policy-making options: (1) no changes in the current regulatory frameworks while increasing non-regulatory incentives; (2) tightening emission- and effect- oriented regulations; (3) prohibiting waste export; (4) setting waste minimization targets for specified waste streams; and (5) banning the use of hazardous chemicals from production processes. I assess these options based on several criteria which include economic costs, risk, efficiency, equity, and implementability.

No changes in regulations, while increasing economic incentives

The use of economic incentives is advanced by most policy-makers and by industry as the most appropriate mechanism to achieve hazardous waste minimization. As opposed to regulations which prescribe the adoption of specific standards and technologies, economic incentives are claimed to have the necessary flexibility to meet the specific needs of different industrial processes

27. Preparatory Committee for the United Nations Conference on Environment and Development, Provisional Agenda of Working Group II, Section 3 (Environmentally Sound Management of Wastes, particularly hazardous waste), A/CONF/151/PC/WG.II/L5.

and the timing of evolving technologies. Because of the diversity of hazardous waste types, and of industrial sources and problems, policy makers suggest that the minimization of hazardous waste cannot be achieved using traditional regulatory approaches, and so they advocate the use of incentives.

Moreover, a regulatory approach to waste prevention is strenuously opposed by industry, which claims that any prescription concerning products, processes, and raw materials would interfere with industrial choice. As opposed to standard-based regulations, the industry argues that economic incentives provide additional scope for exploring efficient solutions and producing innovation. According to the President of the Federation of German Industries (BDI),

In order to achieve further progress in environmental protection, the rigid regulatory framework of environmental policy must be made more flexible in line with the workings of a market economy. In addition to government regulation, this requires more market economy instruments designed to facilitate the implementation of environmentally compatible measures through economic incentives, greater flexibility and more room for manoeuvre.²⁸

Although economic incentives "are not intended to replace the existing regulatory framework," the industry argues that "economic instruments can become fully effective if existing regulations are not tightened still further, and if companies are left with sufficient freedom for innovation."²⁹ The Association of German Industries claims that:

Traditional environmental policy implementation only strengthens companies' inclination to stick to conventional technologies and product lines. Instead, the courage to adopt novel solutions should

28. Heinrich Weiss, 1991, "Making Market Forces Work to Improve the Environment," Extract from a paper delivered at the 2nd World Industrial Conference on Environmental Management (Rotterdam, April 10, 1991). *Environmental Policy and Law*, 21:3/4, 1991, pp. 154-155.

29. Association of German Industries (BDI), 1990, "Economic Instruments in Environmental Protection." Extract published in *Environmental Policy and Law*, 20:4-5, 1990, p. 140.

be rewarded financially.³⁰

At present, various economic instruments are being used or are being adopted by some European countries. They include grants and subsidies for research into implementation of low-waste technologies, tax reduction for capital investments in waste reduction, and charges on waste generation. Although limited in scope, the impact that these measures have in encouraging waste minimization varies according to the different mechanisms they activate. Positive economic incentives such as grants and subsidies have effectively driven capital investment toward waste minimization, though their scope has been obviously limited by restrictions in state budgets. Moreover, the value of state aid has been disputed because it violates the polluter-pay principle which allocates the cost of pollution to generators.

A different economic instrument is the tax on waste production. In Germany, two states, Hessen and Baden-Wurttemberg, already impose a waste tax on generators. Recently, the German Federal Ministry of the Environment has drafted a federal law that establishes a waste prevention tax on special wastes and on landfills. The tax rate per ton of special waste will vary according to the constituents of the waste and will produce between DM 5-6,000 million (\$2,990-3,590 million) of annual tax revenues (Figure 3.4). Charges on wastes are strongly opposed by industry and when applied are more likely to be shifted to consumers than to encourage waste reduction. German industry opposes the new tax and argues that it will make profits impossible. According to the Federation of German Industries, the waste tax is immature and economically unjustifiable and will place German industry at a competitive disadvantage.³¹ The German multinational Bayer AG is already considering closing down the manufacture of

30. Heinrich Weiss, 1991, *op. cit.*, p. 155.

31. *Haznews*, No. 44, November 1991, p. 8.

Figure 3.4

German Tax on Special Waste

	DM/tonne
Prevention tax	
Special waste	100
Industrial + bulk waste	25
Landfill tax	
Special waste	75-100
Industrial + bulk waste	50
Domestic waste	25
Excavated earth/building rubble	15

Proposed waste taxes (DM per tonne)

Source: BMU

two products in the inorganic sector.³²

The limited impact thus far of existing economic incentives in encouraging the minimization of hazardous waste suggests that economic instruments by themselves are not effective. Their effect, in fact, depends on the mechanisms of control created by hazardous waste regulations. If no change in regulation is made, the scope of hazardous waste minimization will remain limited because the loopholes in existing control systems will make non-compliance and waste export to less regulated countries look like a more attractive option. Hazardous waste will still be generated and disposed of, whether in legal or illegal ways. Therefore hazardous waste facilities are likely to be needed in order to provide adequate capacity for treatment and disposal.

Tightening emission- and effect-oriented regulations

Increasing controversy at hazardous waste sites, coupled with limited compliance, is pressuring hazardous waste regulators to tighten emission- and effect-oriented measures and enforcement mechanisms. Several European countries are considering, or have already adopted, amendments to existing regulations in order to strengthen emission standards and increase their control over hazardous waste management. The German Waste Avoidance and Management Act, for example, introduces a uniform system of standards to ensure implementation of the best available technologies for hazardous waste facilities. Recently, Germany adopted new technical guidelines which extend the number of categories of waste considered hazardous. In the UK, the new Environmental Protection Act introduces more stringent licensing and registration procedures. The Netherlands has instituted an integrated permitting system. Italy has adopted urgent provisions for implementing regional hazardous

32. Statement by Herman Strenger (Bayer's chairman), reported by the Chemical Marketing Reporter, Haznews No. 44, November, 1991, p. 8.

waste facilities to provide sufficient treatment and disposal capacity. The EC Commission has proposed two new directives on landfill³³ and incineration³⁴ aimed at harmonizing environmental and technical standards and criteria to be fulfilled at waste facilities' sites in order to ensure a high level of protection.

Other measures aimed at strengthening hazardous waste control systems include provisions on strict liability for the damages created by the improper management of hazardous waste. The introduction of regulations to clean up numerous old hazardous waste sites has led European governments to review the inadequate existing liability mechanisms. Also, a directive that introduces the principle of strict liability³⁵ has been proposed by the EC Commission and is currently being discussed. The aim of establishing a uniform system of liability throughout the EC countries is to ensure that the full cost of the clean-up is borne by the liable waste generators and to ensure "that industry's waste-related costs resulting from environmental damage are reflected in the price of the product or service giving rise to the waste."³⁶

Adopting more stringent emission- and effect-oriented measures as a means of increasing the chances for waste minimization does not imply changes in the current focus and approach of European regulatory frameworks. Instead this option relies on the assumption that raising treatment and disposal costs (to internalize the cost of pollution) will automatically lead to increased waste minimization and ensure safe waste management. This option also presumes that a regulatory approach prescribing hazardous waste reduction at its source would

33. Commission of the European Communities (CEC), "Proposal for a Council Directive on the landfill of waste." COM(91) 102 final - SYN 335, Brussels, 22 May, 1991.

34. Commission of the European Community (CEC), "Proposal for a Council Directive on incineration of hazardous waste." Draft proposal, 1991, Brussels.

35. Commission of European Communities, 1989, "Proposal for a Council Directive on civil liability for damage caused by waste," COM(89) 282 final - SYN 217. Brussels, 15 September, 1989.

36. *Ibid*, p. 1.

encounter enormous implementation problems and great opposition from industry. It also would impose high costs on the industry which would be forced to close down the most affected branches of its manufacturing processes.

Although stricter hazardous waste regulations have clearly raised the standards for hazardous waste management facilities in most European countries, there is no evidence that tightened standards directly enhance the minimization of hazardous waste. Achieving hazardous waste minimization by correcting the market's failure to internalize the cost of pollution implies that effective control of the hazardous waste life-cycle is in fact attainable, in spite of the disagreement among the parties involved in the management of hazardous waste. As I have argued earlier, this assumption is contradicted by the facts in all western European countries. And, even if we were to assume complete compliance with national regulations, the export of hazardous waste will still remain a more competitive option than waste minimization. The increased export of hazardous waste to less regulated countries has emerged in most European countries as a result of tightening hazardous waste regulations.

Prohibiting the export of hazardous waste

Some countries and interest groups support the banning of hazardous waste as the most effective option to make hazardous waste regulation effective and consequently to achieve minimization through internalizing the environmental costs of hazardous waste management and forcing the nations to provide the capacity for treatment and disposal of their own hazardous wastes within national borders. Many of the countries which have already banned the import of hazardous wastes suggest that a worldwide ban on transboundary movement of such wastes would protect less regulated countries from hazardous waste shipments and would help prevent the transfer of environmental risks from developed to less developed countries.

Environmental organizations such as Greenpeace International suggest that such a ban will force the industrialized countries to reduce their hazardous wastes by putting into effect a mechanism that will internalize the costs of pollution as intended by national regulations. The option of exporting waste to a less regulated country undermines the overall effect of the regulations aimed at minimizing hazardous waste. Moreover, exporting hazardous waste from countries with strict regulations to less regulated countries ultimately transfers the environmental hazards across regions, increasing the level of potential environmental risks in countries with less adequate technologies and fewer measures for proper management. To face hazardous waste issues, Greenpeace argues, "it is becoming increasingly clear that what is needed is not a control system but a dramatic phasing out of all waste."³⁷ Beyond merely environmental concerns, environmentalists claim that banning the movement of hazardous waste is required for many other reasons: ethical, economic, and North/South political.³⁸ The export of hazardous waste from rich industrialized countries to poor developing countries is based on unequal relationships and takes advantage of the economic and social problems that developing countries face in entering the world market.

The arguments of environmentalists are, at least in principle, widely recognized by several policy analysts³⁹ and international organizations⁴⁰ who advance the need for an international agreement on the control of transboundary

37. Greenpeace International, 1990, "The Need for a European Waste Prevention Strategy." op. cit., p. 3.

38. Ibid, p. 2.

39. See Harvey Yakovitz, "Monitoring and Control of Transfrontier Movements of Hazardous Waste: An International Overview" in K. L. Zirm and J. Mayer (editors), 1990, *The Management of Hazardous Substances in the Environment*. Elsevier Applied Science, London and New York, pp. 139-162. Also see Christoph Hilz and John R. Ehrenfeld, 1991, "Transboundary Movements of Hazardous Wastes," *International Environmental Affairs*, Volume 3, No. 1, Winter 1991, pp. 26-63.

40. See Mostafa K. Tolba (Executive Director, UNEP), 1990, "The global agenda and the hazardous waste challenge," *Marine Pollution*, Volume 14, No. 3, May 1990, pp. 205-209.

movement of hazardous waste. Hilz and Ehrenfeld remark that the import of hazardous waste to developing countries represents a short-term economic opportunity to reduce their debt burden, but at the "potential expenses of hidden current and future environmental costs."⁴¹ Yakovitz, who has extensively addressed issues of hazardous waste transfrontier movements at the OECD, emphasizes that "the type of wastes most likely to be candidates for export are highly hazardous" because they are the most expensive to eliminate in the home country. If improperly managed, these wastes can pose very high risks and ultimately reduce the future development potential of a country.⁴²

As part of international cooperation efforts, some countries are undertaking initiatives to ban the movement of hazardous waste into developing countries. The European Community has recognized the need to halt the threat posed by hazardous waste movement with the Lome IV Convention which bans the export of hazardous waste and radioactive waste from the EC to 68 African, Caribbean and Pacific (ACP) countries (Figure 3.5).⁴³ On their side, ACP countries have agreed to prohibit the direct and indirect import of such wastes into their territory from the EC and other non EC-countries.

However, there are several arguments opposed to a global ban. One is that it would not be economically efficient since small countries could not take advantage of the economies of scale in other countries.⁴⁴ Another is that it is not practicable because of the opposition of exporting countries.⁴⁵ Such a ban would also result in significant environmental damage due to the current insufficient

41. Hilz and Ehrenfeld, 1991, *op. cit.*, p.

42. Yakovitz, 1990, *op. cit.*, p.

43. Fourth ACP-EEC Convention signed in Rome on 15 December, 1989, Article 39.

44. Hilz and Ehrenfeld, 1991, *op. cit.*, p. 51.

45. *Ibid*, p. 52.

Figure 3.5

List of Countries

¹The 68 (soon to be 69 with the addition of Namibia) ACP countries are: Angola, Antigua & Barbuda, the Bahamas, Barbados, Belize, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo, Djibouti, Dominica, Dominican Republic, Equatorial Guinea, Ethiopia, Fiji, Gabon, Gambia, Ghana, Grenada, Guinea, Guinea-Bissau, Guyana, Haiti, Ivory Coast, Jamaica, Kenya, Kiribati, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Niger, Nigeria, Papua New Guinea, Rwanda, St. Kitts & Nevis, St. Lucia, St. Vincent & the Grenadines, Sao Tome & Principe, Senegal, Seychelles, Sierra Leone, Solomon Islands, Somalia, Sudan, Surinam, Swaziland, Tanzania, Togo, Tonga, Trinidad & Tobago, Tuvalu, Uganda, Western Samoa, Vanuatu, Zaire, Zambia, and Zimbabwe. The twelve EEC countries include Belgium, Denmark, France, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, the United Kingdom, and West Germany.

Source: ACP-EEC Convention 1989

capacity for proper disposal of hazardous wastes in the exporting countries.⁴⁶ A more extreme view is expressed by the United Nations Environmental Program (UNEP) Executive Director, who argues that a global ban would be "against the principle of global environmental management," in that it would block the movement of hazardous wastes "to where they could be disposed of under more environmentally sound conditions."⁴⁷ This statement sounds ironic: so far, hazardous wastes have moved from countries with strict regulations to less regulated countries and not vice versa, which indicates that hazardous wastes are generally shipped to destinations where they are disposed under less environmentally sound conditions than would be possible in the country of origin.

As an alternative to a global ban, it may be more realistic to strengthen and implement the Basel Convention signed by 33 countries on March 1989 in order to secure control of transboundary movement of hazardous waste and safe management in the countries of destination. The Basel Convention restricts the hazardous waste trade by requiring that hazardous waste must be managed in an "environmentally sound manner" and allocating to the exporter states the responsibility for ensuring that exported wastes will be managed properly. To achieve this objective, it establishes that waste exports must receive the written consent of importing states before any waste shipment can take place.

The Convention does not clearly define which standards apply to the principle of "environmentally sound," and whether these standards should reflect the existing regulations of the exporter or importer countries.⁴⁸ Apart from the risk that improper interpretations could leave the present situation unaltered, it is clear that if the standards of exporter countries are not applied, the option of

46. *Ibid*, p. 41.

47. Tolba, 1990, *op. cit.*, p. 208.

48. Hilz and Ehrenfeld, 1991, *op. cit.*, p. 46.

exporting hazardous waste will remain for exporter countries a cheaper option than reducing hazardous waste.

The chance to impose the standards of exporting countries on the management of hazardous waste abroad is, however, less realistic than reaching an international agreement on banning the movement of hazardous waste. In fact, this measure would be opposed not only by exporting countries, for the same reason that they oppose a global ban, but also by importing countries who will contend that this would interfere with their national sovereignty. For exporter countries it would also be impossible to monitor and enforce their standards in the importer countries. Moreover, it would not be practicable to apply the exporter countries' regulations abroad, given that most importer countries do have not the economic and technological resources needed to implement these measures.

From a waste minimization perspective, therefore, the most suitable option would be to phase out transboundary movement of hazardous waste if the minimization of hazardous waste has to rely on mechanisms of internalizing the costs set by hazardous waste management regulations. In such a case, in fact, a complete ban would be the only way to effectively control the hazardous waste life cycle within a national context. Banning the hazardous waste trade would not be so crucial if national governments would consider other mechanisms to enhance waste minimization.

Setting waste minimization targets for specified waste streams

Some European countries have recently adopted a more direct approach to waste minimization by establishing minimization targets and product regulations aimed at cutting priority hazardous waste streams. The Netherlands National Environmental Policy Plan (NEPP, 1990), for example, establishes that high priority waste streams will be screened and measures will be drafted and

implemented in collaboration with target groups in order to reduce selected hazardous wastes by specified deadlines. The German Waste Avoidance and Management Act imposes recycling technologies for waste streams for which these technologies are available. Also, together with other European countries, Germany has introduced restrictions on the selling and disposal of products that contain hazardous substances, as well as prescriptions for labeling these products.

Policies focused on waste streams, processes and products are, in the view of some policy makers, the most suitable approach to waste minimization in that they act at the source. Preventing the production of hazardous waste can be achieved more effectively if we identify and implement measures to reduce specific waste streams caused by different manufacturing processes.

The practicability of this approach depends, however, on the processes set up by regulatory bodies to design and implement these measures. The regulation of waste streams, processes, and products has encountered enormous resistance from industries which claim their right to choose what to produce and how to produce it. Also, industry opposes fixed deadlines on waste streams because they would obstruct efficiency and innovation. Conscious of the strong opposition that would face source-oriented regulations, European governments have carefully avoided adopting a regulatory approach to waste minimization, opting instead for the indirect effect of regulating the management of such waste.

Industry's arguments can, however, be confronted if industry is involved in the process of setting up these measures and deadlines. The government of the Netherlands, for example, has established fruitful relationships with the various industrial sectors to explore alternatives to reduce hazardous waste and set up implementation plans for 29 priority waste streams. These plans will be put in force by the year 1994. This plan is expected to result in substantial reduction of hazardous waste and to improve the efficiency of manufacturing processes in

several industrial sectors.

A good example of the Dutch joint approach by government and industry is the Dutch Hydrocarbons 2000 project through which an agreement was reached on an abatement strategy for the emission of volatile organic compounds. Both parties have explored ways to reduce emissions of VOCs and reached an agreement on the modifications to production processes and products to meet a target of 50% emissions reduction by the year 2000.⁴⁹ This example shows that whether this option can be successfully implemented depends on the approach set by government bodies to formulate source-oriented measures and ultimately on the ability of public agencies to involve target groups and respond to their needs.

Banning the use of hazardous chemicals from production processes

The phase-out or ban of hazardous chemicals from manufacturing processes is advanced by environmentalists as the most effective solution. Environmentalists argue that there is no such thing as safe disposal or proven safe incineration of hazardous wastes. Dumping or burning hazardous waste "inevitably involves moving and depositing pollutants in the environment."⁵⁰ In the environmentalist view, a proposal to phase out all hazardous substances and products has to be considered.

Sweden has advanced a proposal to phase out or ban certain hazardous chemicals in the OECD countries. This proposal, known as the Sunset Chemicals Proposal, calls for uniform international criteria to identify chemicals that are not compatible with sustainable development, and for the development,

49. VROM/DGM, 1991, *Project KWS 2000*. Project Bureau of the Dutch KWS 2000 Project, Den Haag.

50. Greenpeace, 1990, *op. cit.*, p. 3.

cooperatively with industry, of a plan for their phase-out. As opposed to a case-by-case management approach, Sweden argues that a comprehensive and systematic risk assessment approach is essential for the efficient management of hazardous chemicals. In the view of the Swedish government, the phase-out of hazardous substances is necessary to force industry to develop safer substitutes and eliminate environmental and human exposure.

The Sunset Proposal raises several questions and conflicts concerning what criteria will be applied to identify the hazardous chemicals that will be banned. The Sunset Proposal also encountered strong opposition from industry, which claims that fixed deadlines for replacing hazardous substances cannot be established given that substitutes are not available or are available only for some manufacturing processes. These measures, the industry claims, will put many industrial groups, and inevitably the economy of some nations, in a difficult position. Industry also argues that fixed deadlines inhibit their chances to explore the most efficient solutions, thus preventing, rather than promoting, innovation.

To respond to these issues and conflicts, the Sunset Proposal allows producers and consumers to advance their concerns and to participate in drafting the phase-out measures and in setting up an implementation plan. The authors of the proposal are aware of the potential conflicts, but they argue that the recent CFCs case has demonstrated that international cooperation can lead to constructive results. In contrast, other policy analysts, who are concerned with the implementation constraints of such a proposal, argue that the success achieved in the CFCs case is to be ascribed to the single-chemical character of the negotiation and to the availability of CFC substitutes. They contend that an international agreement cannot be achieved when dealing with a broader number of chemical substances, for many of which substitutes are not currently available. In fact, by bringing several issues to the same negotiation table, the risk is that a very wide range of interests and conflicts are likely to halt the negotiation process and inhibit the chances of progressing on single-chemical issues. At the

joint meeting of the OECD Chemicals Group and Management Committee, several countries opposed the Sunset concept, though some of them agreed to establish uniform risk management strategies.

3.5 Summary

The minimization of hazardous waste is widely recognized in European countries as a priority public policy goal. Disagreement exists, however, concerning the options to enhance hazardous waste minimization. In this chapter I have discussed the ability of five policy options to enhance minimization of hazardous waste and the substance of the conflicts that emerge in the policy-making process. I have suggested that the controversial nature and structural uncertainty of hazardous waste issues have important consequences for the choice of proper policies. These factors in fact have important implications on the chance of minimizing hazardous waste.

It is clear that, as long as it is possible for European countries to export their hazardous wastes to less regulated countries, neither economic incentives nor more stringent hazardous waste management standards are likely to reduce the production of hazardous waste. Export of hazardous waste from these countries is in fact a more competitive option than waste minimization. Hilz and Ehrenfeld, who have conducted an extensive study on transboundary movement of hazardous waste, conclude that hazardous waste trade across countries inherently runs counter to any policy for waste reduction.⁵¹

Therefore, the phase-out of hazardous waste movement across countries will be essential if hazardous waste minimization is to rely on the mechanisms of internalizing the pollution cost. In fact this option would allow public agencies

51. Hilz and Ehrenfeld, 1991, *op. cit.*, pp. 54-55.

to control the hazardous waste life-cycle and effectively implement their own policies within each national boundary. The alternative, of controlling hazardous waste movement under the Basel Convention, would not be sufficient since it would fail to internalize the environmental and social costs.

On the other hand, the phase-out of hazardous waste movement would not be so crucial if national hazardous waste policies were to rely on more direct measures aimed at minimizing hazardous waste. These measures include setting minimization targets for priority substances and waste streams, and establishing implementation plans and deadlines in cooperation with industrial sectors. I suggested earlier that the implementability of such options depends upon the capability of public agencies to involve interest groups in setting these measures and deadlines. As suggested by Ostrom, between the market and the central plan solutions there is a third option in governing the commons, where the parties can choose to commit themselves to a cooperative strategy that they will work out together.⁵²

52. Ostrom, 1990, *Governing the Commons: the evolution of institutions for collective action*. Cambridge University Press, Cambridge (UK).

CHAPTER 4
HARMONIZATION OF EUROPEAN
HAZARDOUS WASTE POLICIES

The growing interdependence among nations has been shown to be relevant to the effective implementation of many national policies. Discrepancies among regulatory systems in Europe is shown to run counter to national efforts at minimizing hazardous waste. The creation of a single market in the European Community by the end of 1992, as formalized in a White Paper issued by the European Council in 1985,¹ will exacerbate this interdependence and lead to new conflicts. Increases in waste production and trans-frontier movement of hazardous waste are expected to follow the accelerated economic growth and the removal of barriers. Increased tension is likely to emerge among interest groups and among countries willing to adopt different waste minimization strategies.

The harmonization of hazardous waste policies across the European countries is, therefore, crucial to the success of national policies aimed at minimizing hazardous waste. It also provides an opportunity for these countries to address national and international conflicts. The limited progress, thus far, in establishing a common European environmental regulatory framework shows that different perspectives on hazardous waste issues are likely to emerge.

Three key choices at the center of these controversies will affect the chances for policy harmonization to succeed. The first is the priority that should be given to environmental vs. economic considerations in establishing the single market. The second is the distribution of costs and benefits across different groups and countries. The third is the limitation to the nation-state sovereignty that cross-national priorities may pose. The extent to which environmental, equity, and cross-national considerations will enter the creation of the single market is likely to affect the chance of achieving harmonization of hazardous waste policies.

1. EC Commission, 1985. "Completing the internal market". White Paper from the Commission to the European Council, Brussels.

4.1 Policy implementation and harmonization

As the EC approaches the single market, the harmonization of hazardous waste regulations in Europe will become crucial to achieving the minimization of hazardous waste. EC member states may or may not take measures to harmonize hazardous waste regulations, but it is unlikely that existing policies and their effects will remain unaltered. Discrepances in regulatory systems have been shown to run counter to the effective implementation of national efforts at minimizing hazardous waste.

The Single European Act recognizes the interdependence between the internal market and the implementation of national environment policies, and establishes that the harmonization of environmental regulations must ensure a high level of environmental protection throughout the Community. The act establishes objectives and principles to ensure a high level of environmental protection throughout its member states. Three essential principles designed to guide the Community environmental policy are:

- the prevention principle, which establishes that "environmental damage should as a priority be rectified at the source";
- the polluter-pay-principle (PPP), which sets the cost of pollution to be borne by the polluters; and
- the subsidiarity principle, which limits EC action to the extent that environmental policy objectives can be better attained at the Community level than the national level.²

The prevention principle and the polluter-pay principle set the basis for considering the environment in completing the internal market, and for enhancing cost-efficient solutions by internalizing environmental costs. Central

2. Single European Act (SEA), Article 130R, and Fourth European Environmental Program, paragraph 2.

to the question of how the Community can achieve these objectives is the principle of subsidiarity (or the shared responsibility principle), under which environmental decision making is accorded to the lowest appropriate level of governmental authority (municipalities, counties, provinces and states). The Community, therefore, takes action to the extent that environmental policy objectives can be attained better at the Community level than within individual states.

In practice, these principles have important implications for the implementation and harmonization of the European environmental policies. The application of the subsidiarity principle can accentuate existing differences in the level of environmental protection and environmental quality of member states, which in turn interfere with the full achievement of the single market. According to the Task Force on the Environment and the Single Market, "a complete decentralization of environmental policy following the subsidiarity principle may create a conflict between environmental and market integration objectives."³

To prevent this conflict, the Single European Act requires the Community to harmonize environmental regulations at a high level of protection. Which aspects of environmental regulations are likely to be harmonized, to what level and by which means, are the major unresolved questions. Three key choices are likely to affect the success of harmonization. The first is the extent to which environmental considerations will drive the process of market integration. The second is the influence of distributional considerations in the allocation of costs and benefits. The third is the extent to which countries are willing to forego their national prerogatives in favor of cross-national priorities. In order to assess the chances of achieving harmonization of hazardous waste policies, I have analyzed the variables, actors and conflicts which govern the process of harmonization.

3. EC Commission, 1989. "Task Force Report on the Environment and the Internal Market". op. cit. p. 8.2.

A model of policy harmonization

The flow diagram in Figure 4.1 illustrates the forces governing policy harmonization. In this section I consider economic, political, and social factors in the context of completing the internal market and of the new dynamics and conflicts generated by economic integration.

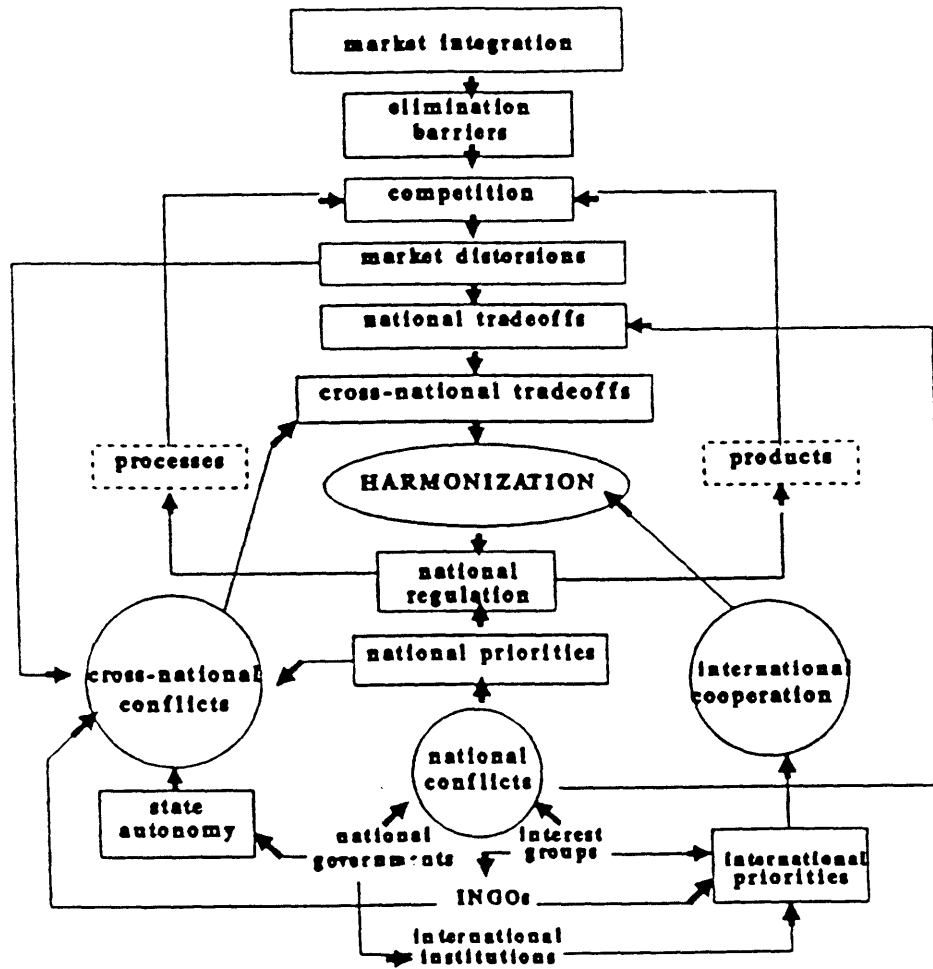
Economic variables. Market distortions, resulting from the removal of internal barriers across countries with different environmental regulations, play an important role in harmonization. They may, however, have a contradictory impact depending on national tradeoffs between economic costs and environmental benefits. Different environmental regulations across member states will impose new barriers across countries and limit the achievement of the full economic gains that could come from completing the single market. Therefore, from an economic point of view, the potential gain from free commerce and trade among states and enhanced competition is a major incentive for harmonizing national environmental regulations. However, a distinction must be drawn among different aspects of environmental regulations.

Eckar Rehbinder and Richard Stewart, who have analyzed mechanisms for integrating environmental regulation in the EC and in the US federal system, argue that "different requirements governing industrial processes and resource development do not threaten free trade as directly as differential product regulations."⁴ According to Rehbinder and Stewart's analysis, with respect to product regulations, both "polluter" states and "environmental" states have interests in harmonization. The level of control at which harmonization will occur depends on the tradeoff between the costs of more stringent control and the benefits of expanded markets in the "polluter" states, as well as between the

4. E. Rehbinder and R. Stewart, 1985. *Environmental Protection Policy*. Walter de Gruyter, Berlin. European University Institute, Integration Through Law Series, Serie A; Volume 2. p. 4.

Figure 4.1

Factors Influencing Harmonization



competitive disadvantages and the benefits of increased environmental quality in the "environmental" states.⁵

The same convergence of interests between "polluter" states and "environmental" states does not occur with respect to regulating industrial processes. Differences in levels of control for industrial processes will not prevent the free trade of products, but they will create competitive disadvantages for producers located in states with more stringent regulations; in fact they will encourage producers to relocate to less regulated countries. Hence, while countries with more stringent regulations have a strong interest in harmonizing control measures on industrial processes, "polluter" countries will oppose such steps.

Politico-institutional variables. The effects of market distortions on the success of national policies will raise conflicts among countries that are seeking different policy objectives and following different strategies. National governments face different problems and are influenced by social preferences and conflicts among interest groups. Environmental regulations reflect national priorities and tradeoffs between economic costs and environmental benefits among these groups.

Conflicts among countries in establishing a common regulatory framework are also generated from the resistance to foregoing their national prerogatives in favor of cross-national initiatives, when these conflict with established regulatory styles and institutional arrangements. Institutional and political divergences across European countries show clearly that harmonization is not primarily a technical problem of standardization. Differences in technical definitions and control systems reflect different political cultures, styles of regulation, and institutional settings. Standards, procedures, and norms within each country are

5. Ibid., pp. 9-13.

meant to regulate and influence different social and economic relationships within each country.

Wynne, who has conducted a comparative study of hazardous waste regulation in Europe and the US,⁶ suggests that decisions apparently technical in different institutional contexts "are shaped by and need to satisfy, different modes of organizational interaction, administrative procedures, and cultural traditions."⁷ My case studies reach the same conclusion and show that this institutional diversity is the reason why the Netherlands uses precise inflexible concentration thresholds to define hazardous wastes, while the UK uses imprecise testing criteria and West Germany a comprehensive list.

Socio-political variables. In spite of these institutional difficulties, the benefits and costs resulting from completing the internal European market go beyond national boundaries. Economic gains and environmental costs affect interest groups at the Community level. International non-governmental organizations (INGOs) which link economic interest groups as well as environmental interest groups, are in a key position to affect the harmonization of national policies by interacting both with national governments and the Community. While these INGOs have had a relatively weak influence on the EC policy process compared to their national counterparts,⁸ the emergence of a new economic, social, and political scenario is likely to affect the tradeoffs between national and international priorities and reinforce the role that these groups play in the political process.

6. Wynne B., *Risk Management and Hazardous Waste: Implementation and the Dialectic of Credibility*. IIASA, Springer-Verlag, 1987.

7. Wynne B., 1987, op. cit., p. 415.

8. Rehbinder and Stewart claim that during the early stages of the Community, political scientists predicted an increasing role of European interest groups in fostering policy integration, but a more recent assessment has questioned this assumption on the basis of the strong influence exerted by their national memberships. E. Rehbinder and R. Stewart, 1985. op. cit. p. 268. It is important to note that at the time of their assessment no concrete steps toward the European market integration had been taken at the Community level.

Actors and interests

To understand the nature of the tradeoffs that will be needed to harmonize hazardous waste policies throughout the member states, it is crucial to examine the actors and interests involved in the policy-making process at the Community level and at the national level.

The European Community. Major actors participating in the policy process at the Community level are the member states which are represented on the European Council. The Community as a whole, however, has its own interests in ensuring the full functioning of the internal market and pursuing common economic and social welfare goals throughout its member states. In line with this general goal, the EC environmental policy aims to harmonize national regulations to prevent distortion in the internal market as well as to ensure minimum environmental standards throughout the Community.

Member states. The attitude of member states towards harmonization of environmental measures reflects national interests and priorities as well as different regulatory philosophies and institutional settings. Although there is no general classification of attitudes,⁹ a distinction can be drawn between states such as the Netherlands, Germany and Denmark, which have adopted stricter environmental regulations, and less regulated states, such as the UK, Italy and Belgium. The former seek to extend their strict measures to the rest of the Community, and the latter oppose policy harmonization because it implies adopting stricter regulations.

Different attitudes of member states towards harmonization can be analyzed on the basis of the present level of infringement of EC environmental law across countries and issues (Figure 4.2). Among the countries which oppose

9. Institute for European Environmental Policy, *Annual Report 1981*, IEEP, Bonn 1982. p. 6.

Figure 4.2
EC Environmental Law Infringements

EC Environmental Infringements							
	Water	Air	Waste	Chemicals	Noise	Nature Conservation	Total
E	12	2	10	4	--	29	57
B	11	3	18	5	2	7	46
Gr	10	4	6	2	3	20	45
F	15	3	2	1	--	20	41
I	9	4	10	2	3	12	40
UK	16	5	3	3	--	4	31
EG	9	4	2	3	--	11	29
NL	6	2	2	3	3	8	24
IRE	7	2	3	2	--	7	21
P	2	1	4	--	--	7	14
L	5	2	2	--	1	2	12
Dk	2	--	--	--	1	2	5

Source: Article by J. Hunt, *Financial Times*, October 1, 1990, based on European Commission Source

stricter regulation, the degree of resistance varies because national governments have different attitudes regarding the implementation of Community Directives. Reh binder and Stewart observe that Belgium and Italy are less resistant than the UK to accepting more stringent regulations, because of their large implementation gap.¹⁰ Member states' attitudes towards favoring the adoption of stricter regulations are also influenced by their access to economic resources, so that less developed countries within the Community, such as Greece and Portugal, tend to oppose the harmonization of strict measures.¹¹

Industry. Industry plays an important role in the process of harmonization, both at the Community level and the national level. At the Community level, industry and trade are organized in the European Federation of Enterprise and in European associations for specific industry and trade categories. European enterprises are generally interested in harmonizing environmental policy because they aim to achieve a fully functioning internal market and they are concerned about distortions that could result from differing national environmental regulations. However, industry interests vary according to particular sectors, and the size and scope of the market, as well as location and the level of control to which it is subjected. The uneven distribution of benefits resulting from eliminating internal barriers, coupled with the costs of market distortions, leads to a range of attitudes within the industry towards integrating national environmental regulations.

A picture of how interests can vary across industrial sectors, size, and country of location, in the context of the single market, is provided by a recent survey carried out by the EC Commission for Economic Affairs (DGIII) on

10. E. Reh binder and R. Stewart, 1985. op. cit., p. 263.

11. Ludwig Kramer, member of the Commission of the European Communities, contends that in addition to the tension between strong and weak member states, there is a tension between northern and southern countries within the Community. L. Kramer, "The European Community," in Turner T. Smith and Pascale Kromarek, *Understanding US and European Environmental Law*, Graham & Trotman/Martinus Nijhoff, London 1989, pp. 4-8.

European industry's perception of market barriers.¹² The survey, completed in 1987, covered 20,000 enterprises throughout the 12 member states. Industries were asked to rank the importance of several types of barriers including technical standards and regulations, administrative barriers, frontier formalities, freight transport regulations, value-added tax differences, capital market control, government procurement restrictions, and the implementation of Community law. The results show that industries gave high ranking to standards and technical regulations as well as administrative barriers. The sectors most affected were reported to be the automotive, electrical, mechanical and chemical industries.

Among the industrial sectors, the chemical industry is of particular importance both as a hazardous waste generator and as one of the targets for hazardous waste minimization policies. The EC estimates that the chemical industry produces on average in Europe 50% of the overall hazardous waste. In addition, with the increasing potential market for environmental protection, the environmental industry plays a decisive role in integration. Although still fragmented and less developed than other sectors, it will be strongly affected by the completion of the internal market.

Environmental organizations. European environmental organizations are extremely politicized and participate actively in the political process at both the Community and the national levels. The patterns of action and the degree of influence of these organizations vary according to their scope, membership, and level of institutionalization, as well as their specific area of policy-making. An important distinction for understanding the European environmental "archipelago" is the distinction between the environmental movement, which consists of a myriad of national and international organizations, and the green

12. Nerb G., CEC Directorate-General for Economic and Financial Affairs, 1987. "The completion of the internal market: A survey of European industry's perception of the likely effects". Brussels, Commission of the European Community.

parties, which are represented in the European and national parliaments. Although members of these different organizations collaborate and in some cases are affiliated to both of them, environmentalists and greens strongly advocate their reciprocal autonomy.

The most relevant environmental organization operating at the Community level is the European Environmental Bureau (EEB). While national environmental interest groups are primarily concerned with exerting pressure on their own national governments to ensure a high level of protection within national boundaries, the EEB sees the harmonization of national environmental policies at a high level of environmental protection throughout the Community as the key condition to confront the problems arising from the single market.

Citizens. National and cross-national tradeoffs between environmental and economic considerations are strongly influenced by the value placed on environmental protection by citizens of the member states. Two recent surveys¹³ show that high importance is accorded to environmental issues in all member states, though public perceptions vary across the states (Table 4.1 and Figure 4.3). High priority is also accorded to harmonization of national regulations by 90% of respondents in another recent European survey.¹⁴

Conflicts and tradeoffs

European market integration is likely to lead to increasing conflicts within and across nations and among interest groups regarding the level of environmental protection that should be pursued throughout the Community

13. Results from two surveys published in NOWEA, Dusseldorf 1989, and in *Europeans and the Environment* 1988, were reported in the EC Commission report *The Environment and the Internal Market*. op. cit., p. 1.10, Box 1C and Table 1.2.

14. The survey results published in *Eurobarometre* No 31, June 1989 were reported in the EC Commission report on *The Environment and the Internal Market*, op. cit., p. 1.10.

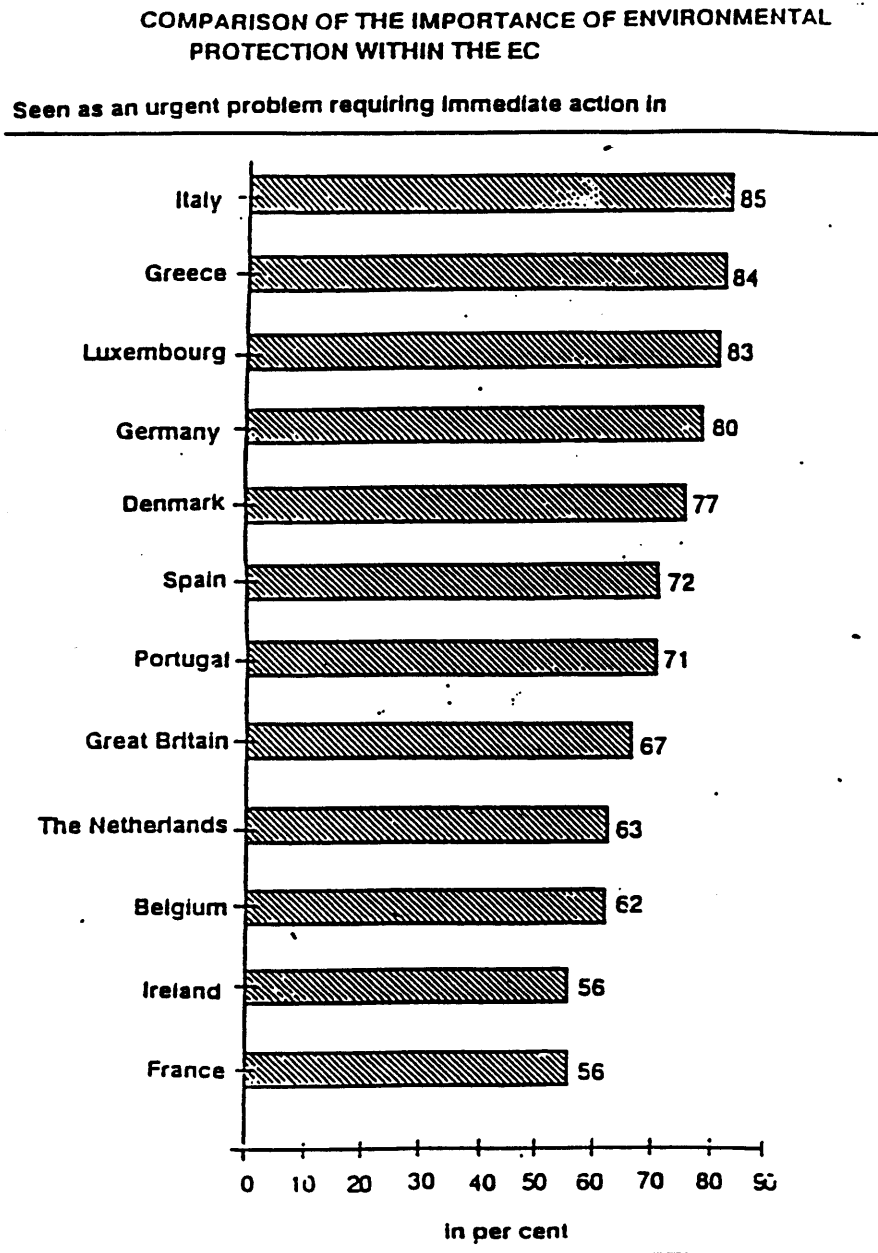
Table 4.1

Comparison of Public Opinion on the Priority
of Economic Development vs. Environmental Protection

	B	DK	D	GR	E	F	IRL	I	L	ML	P	UK	EURO 12
Economic development should take priority over environmental issues	10%	4	5	10	8	8	21	5	4	6	5	9	7
It is sometimes necessary to choose between economic development and the protection of the environment	35%	30	32	22	16	31	26	31	20	36	41	34	31
Protecting the environment and preserving natural resources are essential to economic development	39%	60	57	53	61	57	42	59	72	51	28	51	55
Don't know	12%	6	6	15	15	4	11	5	4	7	26	6	7
TOTAL	100%	100	100	100	100	100	100	100	100	100	100	100	100

Source: "The European and their Environment in 1988", C.E.C., Oct 1988

Figure 4.3



Source: CEC, 1991

and the measures to accomplish this goal. Existing conflicts concerning the production, management and trade of hazardous waste will be exacerbated by economic growth and by the uneven distribution of costs and benefits among interest groups and member states. Moreover, the increased influence of one nation's policy on the policies of the other nations will exacerbate the tension across countries on the proper level of harmonization of European environmental regulations.

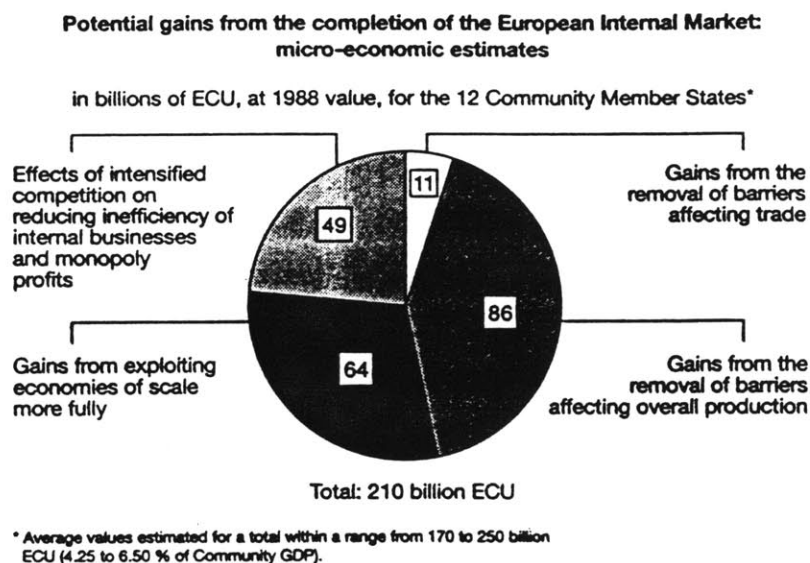
At the center of these controversies there are three key tradeoffs. The first is in the balance of environmental vs. economic considerations in establishing the single market. The second is in the importance of equity considerations in allocating costs and benefits. The third is between national and cross-national priorities.

Environmental sustainability. One major issue which arises from the expected increase in economic growth concerns its environmental sustainability. The European market integration is in fact expected to accelerate economic growth and to increase the volume of goods and services produced due to lower costs and increased competition. The EC Commission's assessment of the economic effects of completing the internal market, *The Economics of 1992*, estimates a potential overall gain ranging from 4.5 % to 7% of gross domestic product (GDP) for the Community as a whole as a consequence of both microeconomic and macroeconomic effects of completing the single market (Figure 4.4 and 4.5).¹⁵

According to a report on *The Environment and the Internal Market* (1989) carried out by a Task Force for the Commission, "in the absence of changes in policies and technologies the increased economic activities will lead to an

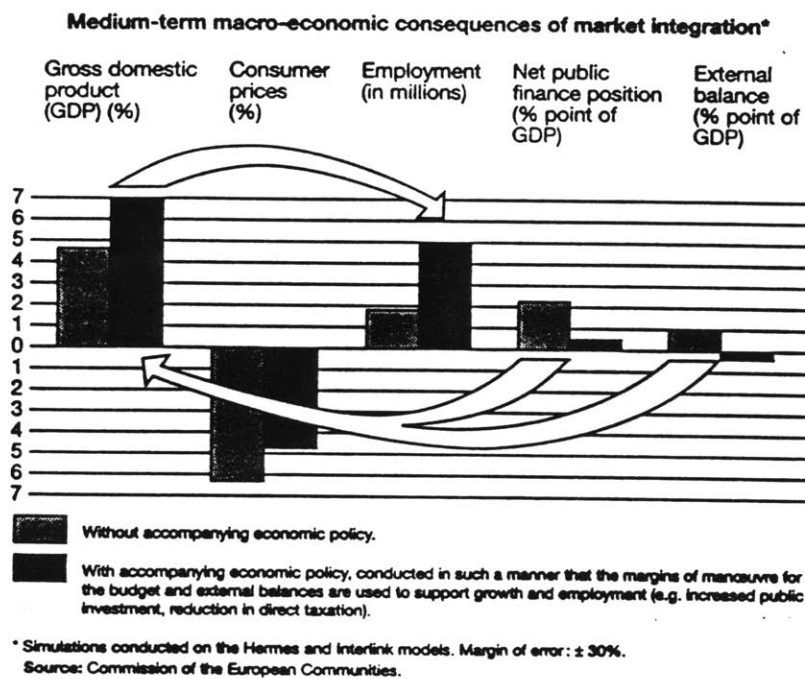
15. M. Emerson et alii, 1990. *The Economics of 1992. The E.C. Commission's Assessment of the Economic Effects of Completing the Internal Market*. Oxford University Press, New York. See also P. Cecchini, 1988., *The European Challenge 1992*. Wildwood House, Aldershot, UK.

Figure 4.4



Source: CEC, 1991

Figure 4.5



Source: CEC, 1991

increase in pollution and the threat to the environment."¹⁶ The same report points out that the completion of the internal market also provides opportunities and resources to "enhance the environmental dimension in the economic development process"¹⁷ and to "ensure that the growth generated by the internal market is truly sustainable."¹⁸ The environmental impact of the expected economic growth will depend on the measures that the EC and member states take in order to break the traditional linkage between economic development and environmental degradation.

The economic assessment of the internal market carried out by the EC Commission does not include the environmental dimension of economic growth in its projection of economic gains. It is clear, however, that there are some costs to ensuring a high level of environmental protection throughout EC countries as stated by the Single European Act; the extent and distribution will depend on the policies that will be adopted at the member state and Community levels. The level of incremental costs that member states are willing to pay for additional environmental protection varies across countries depending on their economic assets, resources, and social preferences.

The different attitudes of member states toward harmonization of hazardous waste minimization policies reflect different tradeoffs between economic development and environmental protection made by interest groups at the national level and by member states at the European level, particularly when balancing national and cross-national priorities. The disagreements across countries are in how to set priorities and distribute the costs and advantages among social groups. There are also disagreement are on establishing proper

16. Task Force Environment and the Internal Market, 1990. 1992: *The Environmental Dimension*. EC Commission, Brussels., p. 7.

17. *Ibid.*, p. 15.

18. *Ibid.*, p. 22.

measures, whether through state intervention or economic mechanisms.

Equity. The creation of the single market will raise new distributional controversies about who benefits from the expected economic growth and who pays for it. The economic gains resulting from the internal market are likely to favor more developed regions located in the Central and Northern areas of the Community which account for a high concentration of growth sectors. On the other hand, the distribution of environmental costs is likely to place a major burden on the less developed Southern European countries. The extent to which environmental considerations will affect the integration of the market influences intergenerational equity.

National attitudes toward harmonization vary with the national tradeoffs between the costs of more stringent standards and the benefits of expanded markets. On the other hand, these attitudes are strongly influenced by the different economic assets of each country. Southern countries, for example, may not be able to afford the level of environmental investment needed to raise environmental standards to a common EC framework (Table 4.2).

Sovereignty. The environmental dimension of the single market also raises the issue of conflicting national versus Community priorities. Although a common environmental regulatory framework is most desirable for its important role in completing the internal market, member states might be more concerned with the national advantages and disadvantages of eliminating economic barriers within the national contexts. In fact, the extent to which states are willing to forego their national prerogatives depends on the perceived gain from cross-national cooperation. Thus, interests in harmonizing environmental measures vary across countries according to tradeoffs between the costs of stricter regulations required by a unified regulatory framework and the economic gains from fully functioning internal market.

Table 4.2

Estimated Investment Required in Southern Member States
to Raise Environmental Standards to Community Norms

Country	Amount (Million ECUs)
Greece	256.725
Italy	13.146
Portugal	904.27
Spain	279.60
<u>TOTAL</u>	<u>1453.739</u>

Source: EC Commission, 1989

Greater resistance from national governments to foregoing absolute nation-state sovereignty emerges when the establishment of a common regulatory framework interferes with established national regulatory styles and institutional arrangement or with some fundamental cultural and social preferences.

4.2 Harmonization of hazardous waste policies

The economic growth and the new cross-national order that will result from the single market are likely to have significant impacts on hazardous waste management across EC member states and to create new conflicts. Presently, the overall amount of hazardous waste produced in the European Community ranges between 20 and 30 million tons per year (EURECO, 1989). Transfrontier movements across European states are estimated to be around 10% of the total amount (OECD, 1989). Most of the hazardous waste treatment and disposal facilities now operating are reaching saturation and there are conflicts about the siting of new facilities.

The completion of the single market in 1992 will exacerbate the problem of hazardous waste management by increasing the amount of waste produced each year in the European Community, saturating existing European treatment and disposal facilities, and increasing transboundary movement of hazardous waste. The increased hazardous waste production and trade, coupled with the existing discrepancies across regulatory systems, will contribute to undermine national efforts to minimize hazardous waste. Increased tensions are likely to emerge among countries willing to adopt different hazardous waste management strategies due to the increasing influence that one nation's policy has on another's.

The impact of the single market

The environmental impact of the European market integration can be

analyzed in two ways: in terms of change in size and patterns of economic activities that result from the removal of barriers, and in terms of the loss of control measures which so far have played a significant role in environmental protection. Both aspects of market integration have important implications for the management of hazardous waste, and their importance will depend on the accompanying environmental policy action at the Community level.

According to the environmental assessment carried out by the EC Task Force, the environmental implications of economic change involve a "quantity effect" due to increased production and consumption, "a structural change effect" that depends on the share of pollution-intensive sectors, and a "technical change effect" that depends on technological development.¹⁹

The potential size and patterns of the expected economic expansion are uncertain because the complex economic dynamics set in motion by market integration are so complex. Economists do agree, however, that there will be a significant increase in the volume of goods and services produced by the lowering of costs and the increasing demand and competition. The economic assessment carried out by the EC Commission predicts an overall increase in economic welfare between 4.5% and 7% in the medium term, depending upon the accompanying economic policies, as a consequence of both microeconomic and macroeconomic effects of completing the internal market. While the "static impact" on costs and competition will be more important in the short run, the "dynamic effects" of increased competition on innovation and technological progress will take over in the long run, inducing a permanently higher rate of economic growth.

Greater uncertainty surrounds the assessment of the patterns of growth. These will reflect the share of economic gains across economic sectors, social

19. Ibid. p. 151.

groups and geographic regions, and will also depend on the national and cross-national conflicts and tradeoffs generated. Market integration will create advantages for those sectors and firms that are internationally more integrated and thus more able to save costs due to the removal of barriers, and for those that have a considerable potential for economies of scale. Although there are no quantitative estimates of how economic gains will be distributed across industrial sectors, size and country of location, a qualitative assessment is provided by the EC study on the "Costs of Non-Europe." The industrial sectors that will gain the most significantly from integration are the transport, chemical and pharmaceutical, mechanical, and paper and printing industries.²⁰

The environmental impacts of the expected changes in industrial sectors can be analyzed by cross-examining the sectoral impacts of the single market in the manufacturing industry (Table 4.3) and specific environmental concerns associated with these industrial sectors (Table 4.4). Examining the two sets of data, the EC Task Force on the Environment and the Internal Market concludes that the environmental impacts will be particularly significant for micro-electronics, textiles, chemicals and pharmaceuticals. A common characteristic of these sectors is in fact the use of toxic chemicals in the manufacturing process which end up in their effluents.

The removal of physical, technical, and fiscal barriers between member states is particularly relevant for its impact on the enforcement of national environmental regulations. Border control checks and national standards and regulations, for example, have so far played a complementary role as instruments of environmental policies. The implementation of the provisions contained in the White Paper, which eliminate these barriers, is likely to affect the impact of national policies which have so far relied on the existence of these barriers.

20. Ibid., p. 87.

Table 4.3

Sectoral impacts of the Single Market

GROUP I

<i>Definition:</i> Industries undergoing rapid technological change where the Single Market could increase Europe's production	
<i>Industries</i>	<i>Challenges and Opportunities</i>
Telecoms services:	Value-added services and continental telecoms
Telecoms equipment:	Capitalizing on Europe's technological lead
Software:	Europeans' mastery of complex systems
Data proc. equipment:	National standard bearers' work on new architectures
Aerospace:	Strengthening Europe's lead
Consumer electronics:	High-definition TV, Europe's chance to catch up
Audiovisual:	The key to a European culture
Semi-conductors:	Reconciling the relocation of production offshore and the development of European R & D potential

GROUP II

<i>Definition:</i> Industries with productivity gains outstripping production growth Production structures fairly similar throughout Europe	
<i>Industries</i>	<i>Challenges and Opportunities</i>
Textiles:	Revitalization of traditional industry by new technology
Plastics:	Capitalizing on the worldwide dominance of the European chemical industry
Pharmaceuticals:	The risk of falling behind in biotechnology calls for stepped-up R & D
Oil and gas:	Adaption for clean fuels (lead-free petrol)
Machine tools:	The mastery certain EC countries have of advanced electronic systems should spread to the rest of Europe
Constr. and housing:	Reorganization of the industry with the opening of public contracts
Food, drink and tobacco:	Sweeping changes in the structure of the industry

GROUP III

<i>Definition:</i> Industries with unequal performance in different European countries No marked increase in production	
<i>Industries</i>	<i>Challenges and Opportunities</i>
Clothing:	Opportunity for new organization structures and innovative link-ups with distribution ("Benetton System")
Automotive:	How to make six general car makers survive and thrive
Steel:	Diversification into new materials to curb job losses
Coal:	An orderly retreat in some countries
Insurance:	Sweeping structural changes of the industry and its products
Transport:	Avoiding "social dumping" in road transport
Electricity:	A single market for distribution still has to be created

Source: "Europe in 1993: Economic Outlook by Sector" -- January 1989 BIPE (Paris)/IFO-INSTITUT (Munich)/PROMETELA (Bologna) in CEC, 1991

Table 4.4

Selected environmental effects of selected industrial sectors

SELECTED INDUSTRIAL SECTORS	RAW MATERIAL USE	AIR	WATER RESOURCES	LAND RESOURCES	SOLID WASTE	NOISE	RISKS OF ACCIDENT	OTHER IMPACTS
MICRO-ELECTRONICS	Chemicals (e.g. solvents) acids	Toxic gases		Contaminations of soils and ground water by toxic chemicals (e.g. chlorinated solvents) Accidental spillage of toxic material				
PETRO-CHEMICAL REFINERIES	Inorganic chemicals	Major polluter: SO ₂ , HC, NO _x , CO, particulates, odours	Cooling water BOD, COD, oil, phenols, chromium, effluent from gas scrubbers		Sludges from effluent treatment, spent catalysts, tars		Risk of explosions and fires	Risk of accidents, noise, visual impact
CHEMICALS	Inorganic and organic chemicals	Major polluter: organic chemicals (benzene, toluene), odours	Organic chemicals, heavy metals, suspended solids, COD, cyanide		Major polluter: sludges from air and water pollution treatment, chemical process wastes		Risk of explosions, fires and spills	Exposure to toxic substances, potentially hazardous products
IRON AND STEEL	Iron ore, limestone, recycled scrap	Major polluter: SO ₂ particulates: NO _x , HC, CO, hydrogen, sulphide, acid, mists	Process water BOD, suspended solids, oil, metals, acids phenols, sulphides, sulphates, ammonia, cyanides, effluents from wetgas scrubbers		Slag, wastes from finishing operations, sludges from effluent treatment		Risk of explosions and fires	Accidents exposure to toxic substances and dust, noise
NON-FERROUS METALS (e.g. aluminium)	Bauxite	Major polluter: CO, SO ₂ particulates	Gas scrubber effluents containing fluorine, solids and hydrocarbons		Sludges from effluent treatment, spent coatings from electrolysis cells (containing carbons and fluorine)			
TEXTILES	Wool, synthetic fibres, chemicals for treating	Particulates, odours SO ₂ , HC	Process water BOD, suspended solids, salts, sulphates, toxic metals		Sludges from effluent treatment	Noise from machines		
LEATHER	Hides, chemicals for treating and tanning		Process water BOD, suspended solids, sulphates, chromium		Chromium sludges			

Source: OECD

Some examples of the role that cross-national barriers play in environmental protection are provided by the Task Force in its report on the assessment of the *Environment and the Internal Market*. The report suggests that:

- Border checks are used to control the movement of nuclear and hazardous wastes and to meet obligations under international conventions relating to the trade in rare and endangered species.
- Technical standards and regulations are used by member states to ensure that products are environmentally acceptable.
- Fiscal provisions are used by some member states to encourage environmentally positive behaviors, and to discourage the reverse.²¹

Although the effectiveness of those measures for environmental protection varies according to specific barriers and different aspects of environmental regulation, their removal, without replacement, will additionally pressure the environment. Particularly critical for its environmental implications is the removal of technical barriers and standards and the application of the principle of mutual recognition which allows products marketed in one member state to have access to the markets in all the other member states.

Increased production of Hazardous Waste. Economic growth is likely to lead to a significant increase in the overall generation of wastes within the Community, which currently totals 2 billion tons per year.²² Presently, 150 million tons out of this total amount are industrial wastes and 20 to 30 million tons are hazardous wastes. OECD statistics on municipal and industrial waste between 1971 and 1991 show an increasing trend in all European countries resulting from increases in consumption patterns and industrial activities. This present trend is expected to accelerate with the expansion in economic

21. EC Commission, 1989. "Task Force Report on the Environment and the Internal Market." op. cit., p. 2.27.

22. Ibid. p., 3.30.

activities.²³

Projections of the actual percentage increase of waste that will arise from the expected increase in production, however, are complex to carry out because of two factors: the uncertainty surrounding the impact of market integration on different industrial sectors, and the present unreliability of waste production statistics across different firm types and sizes. Specifically, statistics on hazardous waste production are still inadequate due to insufficient monitoring activities and different hazardous waste definitions in different EC countries.

A tentative projection of the growth of hazardous waste in Western Europe from 1988 up to the year 2010 is provided by Helmut Kaiser in his study on the European environmental markets²⁴. Although the figures he uses concerning the increase in hazardous waste production are questionable for the reasons mentioned above, Kaiser's modelling exercise is interesting because he shows a significant increase in the amount of waste classified as hazardous that will result from the adoption of new technical guidelines.

Based on the new technical guidelines adopted in Germany, 360 categories of waste are now classified as hazardous, compared to the 80 categories listed in previous guidelines. This alone will increase the amount of hazardous waste annually produced in Germany from 5 million tons to 15 million tons. Applying the same guidelines to all the Western European countries, the amount of hazardous waste will increase from 26.9 million tons (1988) to 85.7 million tons (1992). The implications for management of this increase in hazardous waste are

23. In the EC Report on "The Environment and the Internal Market," the Task Force points out: "Economic growth associated with completion of the Internal market will tend -- other things remaining the same -- to increase the quantities of waste arising within the Community." *op. cit.*, p. 3.30.

24. H. Kaiser. 1989. "The Market for Waste Disposal in West Germany and Western Europe up to the Year 2000." Karl J. Thome-Kozmiensky (editor) *Recycling International*, Volume 1 (1989), EF-Verlag fur Energie-und Umwelttechnik GmbH, pp. 12-23.

enormous.

Saturation of hazardous waste facility capacity. The increase in the total amount of hazardous waste produced within the EC will challenge the capacity of the EC countries to provide safe treatment and disposal for such waste. At present, the overall treatment capacity for hazardous waste in the EC countries is not sufficient and covers only a small portion of the demand. Existing incinerators for the treatment of hazardous waste have a capacity of less than 10% (2 million tons) of the hazardous waste generated in the Community, which currently ranges between 20 and 30 million tons per year.

Other pressures on the treatment and disposal capacity of EC countries must also be considered. First is the phase-out, established in the Oslo Convention for December 1994, of waste incineration at sea, currently estimated at around 80,000 tons per year. Second is the reduction in the waste that will be exported to non-Community countries as a result of the increased control and restrictions set by international conventions (e.g. the Lome IV which ban the export of hazardous waste from the EC to 68 African, Caribbean and Pacific countries) and stricter national regulations on the transboundary movement of hazardous waste. Third, the renewed relationships between Western and Eastern European countries will imply a limitation in the practice of exporting waste to these countries. In some cases, such as unified Germany, this will imply bringing back the wastes that have been exported to East Germany.

As anticipated in the first chapter, treatment and disposal -- instead of prevention, recycling and reuse -- are so far the dominant options for waste management throughout the EC countries. In the view of the EC Commission, this dominant pattern is not likely to change in the short term, though several

countries are adopting mandatory measures for enhancing waste minimization.²⁵ Thus, the urgency of providing sufficient capacity for safe treatment and disposal of hazardous waste in the short term is the primary concern of the EC Commission for the Environment as expressed by the Commission's representative, Klaus Rudischhauser, in a recent workshop on the prevention of hazardous waste promoted by the Scientific and Technological Option Assessment (STOA) Office of the European Parliament.²⁶

Increased movement of hazardous waste. The new European scenario, with the creation of an internal market, "accentuates existing concern over whether toxic wastes can be regarded as goods in the conventional sense and their treatment and disposal viewed as a conventional type of service."²⁷ If wastes are regarded as "goods" in 1992 they will be freely traded among European countries. Having analyzed the difficulties of harmonizing national regulatory frameworks by the 1992 deadline, Lawrence and Wynne question the hypothesis of a single market for waste in Europe by emphasizing its direct and indirect impacts on hazardous waste management without a unified regulatory system. My analysis which follows comes to the same conclusion. In fact, the new EC Directive on the control of transfrontier movement of hazardous waste does not imply stricter control of these movements within the Community.²⁸ On the other hand, efforts aimed at harmonizing standards for disposal and incineration face enormous difficulties.²⁹

25. Interview with K. Rudischhauser of the EC Commission DG XI, Brussels, January 14, 1991.

26. Scientific and Technological Options Assessment (STOA), European Parliament, 1990, "Hazardous Waste Project" Summaries. Strasbourg, 17 May 1990.

27. D. Lawrence and B. Wynne, "Transportation Waste in the European Community: A Free Market?", *Environment*, Volume 31, No. 6, July/August 1989, p. 12.

28. See proposed Council Regulation on the supervision and control of transfrontier movement of hazardous waste meant to replace Council Directive 84/613/EEC (COM(90) 415 final of 26 October 1990) and amended proposal of December 1991.

29. See proposed Directives on landfill (COM(91) 102 final of 22 May 1991) and on incineration of hazardous waste, 1991.

Different levels of regulatory strictness and disposal costs will encourage movement of wastes towards less regulated countries. Already, the patterns of transfrontier movements parallel the patterns of difference among the less structured enforcement systems versus the well-articulated and functioning systems. West Germany and the Netherlands export, respectively, 700,000 and 155,000 tons, corresponding to 14% and 10.3% of their production (OECD, 1989). France and the United Kingdom import, respectively, 250,000 and 83,000 tons (OECD, 1989). ISWA reports indicate that Spain is a significant importer, although exact data are not available.³⁰ The most likely direct effect of such a single trade market will be an increase in this trend.

Among the likely indirect effects of the market integration are the market distortions that may result from unbalanced regulations across countries. An example is the competitive disadvantage for countries with stricter environmental regulations and/or higher environmental expenditures. The export of hazardous waste will result in nations externalizing the costs of proper hazardous waste management and transferring inherent risks to the importing countries. This cheaper option will also affect the market in secondary materials and make it impossible to establish a stable market for hazardous wastes.

To the extent that existing barriers across countries will be eliminated and no steps will be taken to harmonize standards and regulations, these effects will undermine the national policies aimed at reducing the amount and toxicity of hazardous waste.

Policy Options

The three options considered here include: (a) no harmonization, (b) sectoral harmonization, and (c) complete harmonization (Table 4.5) The first

30. ISWA, op. cit., Table 10, p. 48.

option is built on the assumption that the current level of harmonization across hazardous waste policies remains the same. The second option implies that current efforts of the EC to harmonize hazardous waste regulations succeed. The third option requires the establishment of a common European framework built on the whole set of regulations already in force in member states.

The first option implies that no action will be taken by member states to harmonize their hazardous waste definitions, and their standards and procedures for waste management, while waste can be traded freely across national borders. This scenario refers to the current relevant EC regulations for minimizing hazardous waste. As is clear from Table 4.5 (Option A), the current EC regulatory framework does not include explicit provisions for waste reduction and member states have so far not agreed on the standards to be adopted for hazardous waste management. In this scenario, differences across national standards and regulations are likely to lead to market distortions which will ultimately conflict with the full functioning of the internal market. As I argued earlier, differing regulations across EC countries will impose disadvantages on those countries which already have or are willing to adopt more stringent hazardous waste policies. Compared with the other countries, these countries in fact would be in a weaker competitive position because their stricter environmental regulations impose higher costs on production. Also, the increased waste movement towards less regulated countries will externalize the costs of proper waste management and will transfer environmental risks to the importer countries.

The second option refers to a gradual process of harmonization across specific aspects of hazardous waste management which will ensure a high level of environmental protection throughout the Community, while ensuring equal conditions of competition across member states. The implications of this option may vary enormously depending on the interpretation of the principles and objectives set in the Single European Act. Two variants of this option must be

Table 4.5

Policy harmonization options

POLICIES	OPTION A	OPTION B	OPTION C
PRODUCTS	# Product standards	# Ecolabel # Product standards # Packaging standards	# Ecolabel # Product standards # Packaging standards # Emission charges # Tax differentials # Restrictions on products
POLLUTION CONTROL	# Emission standards # Monitoring and reporting	# Emission standards # Environmental audits # Monitoring and reporting	# Emission standards # Ambient quality standards # Integrated permitting # Eco-auditing # Best Available Technology Criteria # Environmental charges
WASTE REDUCTION	# No provisions	# Product specifications # Packaging specifications # Restriction on certain substances	# Priority waste streams targets # Restriction on certain substances # Packaging return systems # Product and process specifications
HAZARDOUS WASTE MANAGEMENT	# Waste management plans # Integrated facilities and networks for waste management # Monitoring and reporting	# Waste management plans # Integrated facilities and networks for waste management # Monitoring and reporting # Standards for landfill and incineration	# Standards for - landfill - incineration - treatment # Specifications for managing certain hazardous waste streams
HAZARDOUS WASTE MOVEMENT	# Basel Convention prescriptions # Restrictions on waste export to APC countries	# Export restrictions outside the EC for disposal # Monitoring and reporting	# Restrictions on waste export outside and across EC countries # Monitoring and reporting
CLEAN UP OF CONTAMINATED SITES	No provisions	# Standards for risk assessment	# Strict liability schemes # Monitoring and reporting # Standards for risk assessment

considered. A first variant refers to the harmonization of those aspects of hazardous waste management which affect competition and may ultimately prevent the full functioning of the internal market. As established with the Single European Act, the European Commission shall "adopt the measures for the approximation of the provisions laid down by law, regulation or administrative action in member states which have as their object the establishing and functioning of the internal market."³¹ If harmonization is driven by the need to prevent market distortion, the regulation of products is likely to have a high priority because of its essential role in making the internal market work. However, the varying regulations on emissions and ambient quality standards across member states do not prevent products manufactured in less regulated countries from gaining access to the markets in countries with more stringent regulations. Thus, in such cases harmonization of emissions and ambient quality standards are likely to attract less attention in the short term. Consequently member states are likely to achieve a common regulatory framework for the regulation of hazardous wastes regarded as products because they must conform to specific technical standards for trade. However, different national regulations for waste treatment and disposal will still create market distortions and conflicts across national boundaries.

A second variant emphasizes the additional conditions for harmonization based on the environmental policies of the Community. This variant stems from a broad interpretation of the principles and objectives set out in the Single European Act. To ensure a high level of environmental protection throughout the Community, in fact, the harmonization of environmental measures requires that environmental considerations be taken into account not only as a function of preventing market distortions but also to enhance environmental quality goals. In the field of hazardous waste, this broader view implies harmonization of standards for hazardous waste management across member states in order to

31. Single European Act, 1987 Article 100A.

ensure that hazardous waste will be minimized and safely treated or disposed of as close as possible to the point of origin.³²

The third option is complete harmonization. It alludes to the proposal by some countries, such as Germany, to impose their standards throughout the Community's member states. The argument for complete harmonization is that a high level of environmental protection coincides with the level achieved in countries with stricter regulations; and it can be pursued only by extending these regulations to less regulated countries. This option implies that the twelve member states will agree on the objectives and policies to pursue proper waste management as well as on the regulatory instruments to achieve such objectives. It also implies increased regulatory and enforcement power by the European Community to impose and oversee the implementation of national regulations.

Implications for Hazardous Waste Minimization

The completing of the single European market will have different implications for implementing national waste minimization policies depending on the options the various EC member states seek.

The "no harmonization" option has already been discarded as a non-option in the EC policy debate. If countries maintain their current differences in hazardous waste policies and regulations, the market distortion that results will, in fact, conflict with the objective of completing the internal market. However, the counter-forces governing the process of completing the single market might obstruct the harmonization process to the extent that substantial differences will remain after the term established for completing the internal market. In such a case, this conflict is likely to increase the tension between member states willing to adopt more stringent measures and those willing to maintain more flexible

32. Cfr. EC 5th Environmental Program, Section on the policy for waste management.

ones. This increased tension will induce several member states to act on an individual basis in order to achieve their desirable level of environmental quality.

If no steps towards harmonization are taken, discrepancies among control systems are likely to undermine national efforts at hazardous waste minimization. First, increased hazardous waste production resulting from increased growth will offset national efforts to harmonize hazardous waste. Second, the increased trade in hazardous waste will break the "waste life cycle," with related effects on the regulation of hazardous waste. Many analysts are concerned that exporting states will lose control over their national policies and standards because of the extensive cross-country waste trade and the current discrepancies in definitions and control systems.³³ In Germany, for example, strict restrictions on waste export in the states of Bavaria and Hesse have proven to be crucial for ensuring effective implementation of high performance standards in managing hazardous waste. In fact another German state, North Rhine-Westfalia, which has not adopted such strict restrictions, failed to accomplish the same objective because of the cheapest option left to industries: to export their waste.³⁴

Also, the breaking of the waste life cycle can affect the success of hazardous waste prevention policies by reducing the incentives to implement waste minimization programs. Export to EC countries regulated by less stringent control systems constitutes a cheaper option that may prevent incentive mechanisms (such as raising the cost of disposal) from succeeding in other countries. This will raise new conflicts across member states at the Community level as well as among interest groups at the national level.

On the other hand, complete harmonization of hazardous waste regulation

33. Lawrence, D. and B. Wynne, 1989, *op. cit.*

34. *Cfr.* Chapter 1.

is not possible given that member states intend to maintain their full autonomy in establishing national environmental policies and priorities, while complying with the measures established in the Single European Act. According to this Act, state autonomy in environmental matters is limited only to the extent that it obstructs the full functioning of the market and does not comply with minimum environmental standards set by the Community. The principle of shared responsibility established with the Single European Act states that environmental decision-making should be done at the lowest appropriate level of governmental authority. Thus, it limits EC environmental policy to those environmental objectives that can be better attained at Community level.

Most likely, the Community will seek partial harmonization of specific aspects of environmental policies. What level of harmonization is likely to be achieved and on which aspects of environmental regulation depend on the tradeoffs that will be made by member states and on the capacity of the Community to lead this process. The range of interests and tradeoffs involved in environmental decision making is unevenly affected by different aspects of regulation, which suggests that the chances for policy harmonization vary considerably among sectors and instruments of environmental policy. Also the approach to harmonization that will be adopted, whether driven by economic or environmental considerations, is crucial to its outcome.

As already argued, a major distinction can be made between the regulation of products and the regulation of processes. The harmonization of product regulations, as provided by the Single European Act, is likely because of its role in completing the internal market and because of the convergence of several national and Community-wide interests. On the other hand, harmonization of regulation concerning industrial processes, which does not have the same convergence of interests, will encounter greater difficulties.

If partial harmonization is driven only by economic considerations,

hazardous wastes that are being regarded as products will be regulated to conform to specific technical standards, though the treatment and disposal standards will still vary across national boundaries. As already argued, this will encourage waste generators to export their waste to countries with less stringent regulations. Furthermore, in the absence of a common regulatory framework for industrial processes, member states that are willing to adopt more stringent measures will suffer from competitive economic disadvantages and from the fact that their hazardous waste minimization policies will be undermined.

Most desirable is that environmental considerations will enter into the process of policy harmonization in order to ensure that the requirement for a high level of protection set by the Single European Act will be translated into a common framework for regulating hazardous waste management. This implies harmonization of technical definitions and of environmental standards for managing hazardous waste throughout the Community. It also implies exploring alternatives to set and implement common targets for minimizing hazardous waste.

4.3 Strategies of policy harmonization

In principle, cross-national policy convergence can only be sustained by political, economic, and scientific collaboration. From a public policy perspective, the global interdependence of chemical control leads political leaders to a growing interest in searching for a common regulatory response and legitimizes EC intervention. From an economic perspective, the highly integrated market in chemical production increasingly concerns both the private and public sectors because of the distortions of market, investments and trade that divergent regulatory requirements can produce. Moreover, the growing interest of the scientific community in developing international networks and establishing a common scientific base for hazardous assessment plays an important role in

achieving policy harmonization.

However, the limited progress in establishing common regulatory systems for hazardous waste management indicates that "the threshold of market disruption justifying Community rather than separate action remains fairly high."³⁵ Moreover it indicates the contradictory role played by the market in driving harmonization in the specific area of hazardous waste. As noted by Wynne and Lawrence, "hazardous waste regulation is quite different from the more usual regulation of stationary pollution sources. Discrepancies in standards alone may stimulate an international waste trade in particular directions, because hazardous wastes are intrinsically mobile substances."³⁶ Paradoxically, economic factors simultaneously produce incentives for and resistance to harmonization. Incentives are produced by the chemical industry's increasing interest in avoiding market distortions and maintaining comparable competitive conditions in the market. Resistance to harmonization reflects the desire of particular industries to escape strict control systems in their own countries.

It is clear that if a unitary regulatory framework is to be achieved the Community and the national governments will have to take an active role. The Single European Act of 1987 enables the Community to lead this process by explicitly recognizing its role in establishing environmental protection targets and empowering the Community to harmonize environmental regulations which interfere with the full functioning of the internal market. Moreover, it states that a high level of environmental protection must be achieved throughout the Community. It also provides the European Commission with precise rules both for monitoring compliance and for taking a non-compliant member state to the

35. Ronald Brickman, Shiela Jasanoff and Thomas Ilgen, 1985. *Controlling Chemicals - The Politics of Regulation in Europe and the United States*. New York, Cornell University Press. p. 299.

36. Lawrence, D. and B. Wynne, 1989, *op. cit.*, p. 34.

European Court of Justice.³⁷

Current progress in EC environmental policies does not indicate, however, how the Community will put in to practice the SEA requirements. For example, the 5th EC environmental program, which establishes as one of its targets the implementation of the hierarchy of hazardous waste management options, does not indicate how this objective will be achieved. In particular it does not address how the Community will confront the conflicts that are likely to emerge among member states and among interest groups. A common European regulatory framework implies comparable hazardous waste definitions as well as conformation of standards for waste storage, treatment and disposal, and of procedures for facility siting. Moreover, to achieve the minimization of hazardous waste requires that targets be set and that member states cooperate to achieve these targets.

The emergence of the new European scenario could affect cross-national interests to the extent that Community priorities for harmonizing national regulations would overtake national prerogatives, but the decision on how strict regulations should be will still depend on the tradeoffs within and between "polluter" and "environmental" countries. These countries in fact would support harmonization for different reasons. Moreover, disagreement exists among countries and among interest groups as to what constitutes a "high" level of environmental protection.

One factor that has impeded the development of strict requirements for waste prevention in individual countries is the prudence of governments in

37. Based on the EEC Treaty, when a Directive is adopted by the Council, the Commission send a form letter to each member state referring to the directive and the deadline to comply with the adoption of national law. The formal infringement procedure (Article 196) is the ultimate measure that allows the Commission to obtain compliance by delivering a reasoned opinion and, if the state does not comply, bringing the matter before the Court of Justice. (Kramer, L. 1989)

weakening the competitive position of private enterprise at the national and the international levels. Presently, this same concern might play a major role in the process of policy harmonization. Furthermore, governments are concerned to address the national priorities which vary enormously across countries depending on economic assets and social preferences. Difference in institutional settings and regulatory styles across European countries play a major role in inhibiting harmonization.

To confront the political and institutional complexity of policy harmonization, both the substance of the conflicts and the process by which a binding agreement could be reached seem to be relevant. Working toward the harmonization of control systems for hazardous waste implies facing the differing priorities of the national policies in order to develop and articulate common policy goals and strategies. Policy harmonization also implies facing the differences in institutional settings and regulatory approaches across EC countries and the conflicts that these differences generate.

As argued in this chapter, policy harmonization is not primarily a technical problem of standardization. Major institutional differences, which may affect the success of harmonizing European regulatory schemes for hazardous waste management, should be addressed to achieve a common strategy. They include the formal vs. informal approach to regulation, the governmental intervention vs. market oriented approach, the degree of centralization of institutional arrangements, the degree of public access to information and rule-making, and the way scientific controversy is handled in the policy context.

Crucial to policy harmonization is the implementation of the Community measures, which depends on the level of consensus reached by nations and within each national context. National governments often resist establishing a common regulatory framework because of conflicts with established national regulatory styles and institutional arrangements; this was widely documented

at the EC level by the Sixth Amendment case.³⁸ This implies that the means by which harmonization will be achieved is equally essential to its success.

A major challenge for the European Community to achieve the harmonization of hazardous waste management policy is to confront the political and institutional diversity reflected in the existing disputes on hazardous waste. This challenge concerns both the participation and contents of the EC policy-making process questioning its limited adversarial nature. While re-designing a European hazardous waste policy, the EC must develop new tools to cope with the diversity of national perspectives and with the conflicting interests among economic and political actors within and across member states.

Important reforms are required to face four new challenges: (1) expanding the participation of all interest groups in setting these measures; (2) setting waste minimization targets and implementation plans; (3) involving the scientific community in order to ensure that important scientific uncertainties concerning the risks are considered; (4) linking waste minimization policies into economic and development policies. Before turning to discuss these reforms in the conclusions of this dissertation, the next chapter examines the EC policy makers view and assess the chances for these reforms to succeed.

38. The resistance of national governments to foregoing their national prerogatives in order to achieve a cross-national regulatory framework is well documented in the debate among EC member states on the so-called Sixth Amendment regarding notification requirements for industrial chemicals. The most antagonistic positions, during 36 months of negotiation, were expressed by the UK and West Germany. The British wanted to be exempt from notification requirements and wanted a considerable degree of discretion to be left to national authorities. In contrast, the German insisted on an enforceable European scheme. Thus, the Sixth Amendment case exemplified the contrast between the flexible British and the highly formal German philosophy of regulation.

CHAPTER 5
THE EUROPEAN POLICY-MAKERS VIEW
OF POLICY IMPLEMENTATION AND HARMONIZATION PROBLEMS

The chances of success for the European policies aimed at minimizing hazardous waste have so far been seen to depend on the involvement of all interest groups in the policy-making process, and on the ability of public agencies to recognize and resolve the conflicts that are likely to arise. The success of hazardous waste minimization efforts in one country is also seen to be strongly influenced by the policies of other countries. Thus, the harmonization of European policies is crucial to the implementation of national objectives.

In this chapter I assess the chances of achieving hazardous waste minimization in the future by focusing on the policy makers' perceptions of hazardous waste issues and on their views regarding the solutions to past policy failures. The policy makers' views were collected through a special survey at the European Parliament. Three main results were found. First, there are conflicting priorities across countries and between national and Community perspectives. Second, responses cluster according to countries instead of political groups. Third, there is a gap between the way policy makers frame the problem as essentially a political problem and the search for a primarily technical solution.

5.1 The issue

To examine how policy makers at the EC level assess hazardous waste issues in light of the European market integration, I conducted a survey among 100 Members of the European Parliament who participate in the European Parliament's Commission for the Environment, Public Health and the Protection of Consumers.¹ The survey was designed to ascertain how policy makers assess

1. Note that the EC Parliamentary Committee for the Environment, Public Health and the Protection of Consumers is a separate institution, distinct from the EC Commission Directorate-General XI. The Parliamentary Commission consists of a selected number of Members of the European Parliament who proportionally represent all political groups. Members of the EC Commission DGXI, on the other hand, are designated by the national governments.

the impact of market integration on the minimization of hazardous waste, both in the Community as a whole and in their own country. Specific questions were designed to elicit their views on the opportunities for and constraints on harmonization of hazardous waste policies across European countries. Policy makers were also asked to rank different options to confront current difficulties in achieving a common EC regulatory framework.

Survey questions

The survey questionnaire was designed to highlight two areas: first, the policy makers' views of the problems concerning hazardous waste management arising from market integration, and second, possible solutions and potential constraints (See Appendix A). The survey addressed five key questions:

- Which effects will most likely occur as a result of completing the single market in the EC as a whole and in the EC countries?
- How will the single market affect national hazardous waste policies?
- To what extent will harmonization of national regulations reduce these effects?
- Which is the most appropriate approach to achieve harmonization of regulations in EC member states?
- What is the nature of the obstacles to policy harmonization?

On the first question, the problems arising from market integration, the respondents were also requested to rank the likelihood of effects for the EC as a whole and in their country of origin. They were also asked to indicate whether the single market would encourage or inhibit different aspects of national hazardous waste policies.

The questionnaire also requested the respondents to judge policy harmonization as a means to prevent the most likely adverse effects; to indicate

what policy harmonization should seek to accomplish; and to specify which effects could be most successfully minimized by a common EC regulatory framework. Two final questions inquired about policy makers' views of the most suitable approach to achieve policy harmonization and the nature and influence of obstacles.

The sample

The Members of the European Parliament (MEPs) who participate in the Commission for the Environment, Public Health and the Protection of Consumers represent a cross section of EC policy makers covering all member states and political groups. The choice to limit the survey to participants in the Commission was suggested by a preliminary survey conducted among a limited number of MEPs. This test showed that task allocation was highly specialized among the members of political groups. Respondents not directly involved in environmental policy-making claimed to be incompetent in the field of hazardous waste management and referred me to members of their political group who were concerned with environmental issues. These members were part of the European Parliament's Commission for the Environment, Public Health and the Protection of Consumers.

Survey response

The survey response rate was 48% out of the 100 Commission members contacted. Respondents represent all the EC member states and political groups. Countries most frequently represented among the respondents were Germany, the Netherlands and the UK. Socialists and Liberal Democrats were the most frequently represented political groups.

5.2 Harmonization of hazardous waste policies

It was clear from the survey responses that EC policy makers appreciate the fact that the single market will exacerbate the problems of hazardous waste management. The most likely impacts, ranked by number of responses, were reported to be: the increase in hazardous waste production, the increase in waste trade, and the saturation of waste management facilities.

A striking response which emerged from the survey is the wide agreement -- by 78% of the respondents -- that the problem of hazardous waste management is likely to be exacerbated by the creation of the single market (Figure 5.1). The most likely impacts, ranked by number of responses, were increase in hazardous waste production, increase in waste trade, and saturation of waste management facilities (Figure 5.2). Only a few responses indicated an increase in hazardous waste management costs resulting from market integration. Respondents ranked differently, however, the chances of these effects occurring in the EC as a whole and in the respondent's home country, showing a significant difference between Community and national concerns.

At the national level the ranking of likely impacts varies significantly (Figure 5.3). German respondents are more concerned with the potential increases in waste production, while respondents from the UK, Belgium and Italy are more concerned with the increase in waste trade. Dutch respondents ranked the saturation of existing waste facilities as the most likely effect. With the exception of France and Belgium, all of the more developed countries of the Community are highly concerned with the saturation of hazardous waste facilities. On the other hand, less developed countries, such as Portugal, Spain and Greece, gave low ranking to the overall effects of market integration on the problems of hazardous waste.

The respondents agreed on the impacts that the single market will have

on national hazardous waste policy. According to the majority of respondents, the single market will create incentives for waste prevention, recycling, safe treatment and disposal, and control over export/import.

The results show strong disagreement, however, as to the possibility of reducing the overall impact by means of policy harmonization. The respondents also disagree on the suitability of different approaches to achieve a common regulatory framework. Conflicts of interest and interference with state sovereignty were ranked as the most influential factors standing in the way of policy harmonization, though de-aggregated responses by countries show a more complex response.

The majority of respondents indicated that they expect market integration to have a positive impact on national hazardous waste policies. Among these impacts were: encouragement of waste prevention (43.8%), waste recycling (62.5%), safe treatment and disposal (68.8%), and control of waste export/import (62%) (Figure 5.4). Among the respondents who expected negative impacts, those from Denmark and Germany were concerned that waste prevention would be inhibited and those from the UK and Belgium feared a loss of control over the waste trade. A summary of the survey's responses on the effects of the European single market is in Table 5.1.

5.3 Obstacles to policy harmonization

A greater range of opinions emerges regarding the harmonization of national hazardous waste regulations (See summary in Table 5.2). The majority of respondents (56.2%) agree that policy harmonization would reduce the problems resulting from the integration of the market, though a large number (43.7%) disagree (Figure 5.5). All the members of the Greens and of the European United Left agree, compared to only 50% of those who are members of the

Table 5.1

SUMMARY OF SURVEY RESPONSES

Impacts of the EC Single Market

Economic growth resulting from the EC market integration will exacerbate hazardous waste problems		agree 78% disagree 22%		
Impacts on waste management:	% of responses ¹	likely	neutral	unlikely
-increase production	(28%)	65%	20%	15%
-increase trade	(24%)	57%	18%	25%
-increase cost of mgt	(12%)	47%	26%	27%
-saturate facilities	(20%)	56%	31%	13%
-inhibit prevention	(16%)	50%	12%	38%
	(100)			
Impacts on national policies:		encourage	inhibit	no effect
-waste prevention		44%	31%	25%
-waste recycling		67%	20%	13%
-safe treatment and disposal		69%	19%	12%
-control over export/import		62%	31%	6%

¹ () % of # responses of most likely impacts

Table 5.2

SUMMARY OF SURVEY RESPONSES

Policy harmonization

The harmonization of national regulation might reduce these impacts on waste management		agree 56% disagree 44%		
Approaches to harmonization:	% # of responses ²	most appropriate	neutral	less appropriate
-monitoring and reporting	(30.8%)	80%	20%	-
-standardization	(34.6%)	93%	7%	-
-negotiation tables	(3.8%)	7%	70%	13%
-increase EC enforcement power	(30.8%)	73%	20%	7%
	(100)			
Obstacles to harmonization:	% # of responses ³	most influential	neutral	no influence
-interference with State sovereignty	(23.3%)	67%	7%	26%
-different styles of regulation	(14%)	40%	40%	20%
-diversity of institutional settings	(7%)	25%	50%	25%
-resistance of bureaucratic structure	(16.3%)	47%	27%	27%
-conflicts of interests	(27.9%)	80%	13%	7%
-scientific and technical controversies	(11.6%)	33%	13%	53%
	(100)			

² () % of # responses of most appropriate approach to harmonization

³ () % of # responses of most influential obstacle to harmonization

Socialist and Liberal Democratic groups. All respondents who are members of the European People's Party disagree. Convergent opinions seem to group according to countries instead of by political groups: all the respondents who disagree are from Germany and the UK.

Conflicts of interest and interference with state sovereignty are ranked overall as the major obstacle to policy harmonization, followed by resistance of bureaucracy and differing styles of regulation. Scientific and technical controversies were ranked as the least influential factor. The ranking of obstacles by country, however, shows a more complex picture of constraints due to the different perspectives on policy harmonization among Member States (Figure 5.7).

Respondents from Denmark and the UK, which have the most widely contrasting approaches to environmental policy, ranked interference with state sovereignty as the most influential factor. Indeed, one can argue that the results of the recent referendum in Denmark add new evidence of this pattern. Respondents from other countries, such as Spain, indicated that the resistance of the bureaucratic structure would be the major obstacle. For Italian respondents, the most influential factor is conflict of interest.

5.4 Solutions

Regarding policy harmonization, an interesting paradox emerges. The major obstacle to policy harmonization was reported to be conflicts of interest (75%). The most suitable approach to achieve harmonization was reported to be standardization of technical definitions and standards. Thus, there is a contradiction between framing the problem of harmonization as being an essentially political and economic problem and providing a primarily technical solution. The evidence of a gap between the problem and the proposed solution

is reinforced by the fact that only 7% of the responses considered negotiation to be the most appropriate approach to policy harmonization. (Figure 5.6). Instead, 50% of the respondents indicated increased EC enforcement power and monitoring activities as the other most appropriate way to achieve harmonization.

5.5 Remarks

Policy makers' perceptions of the environmental problems resulting from completing the internal market are not an indicator of what environmental problems the European countries will in fact face after 1992. They are, however, a good indicator of whether these problems are or are not on the political agenda and of how policy makers seek to address them in the political arena. Moreover, at the EC level the different policy makers' perspectives reflect the conflicts and tradeoffs they face at the national level. Therefore, by analyzing the results of this survey we can not only learn how European policy makers seek to minimize the impact of market integration on the expected increase in hazardous waste production and trade; we can also analyze the obstacles and conditions for success.

The survey results show a clear distinction between the EC and the national most-likely effects as perceived by the respondents. The results suggest conflicting priorities across countries. They also suggest that national and Community priorities will in most cases be in conflict. This distinction is reinforced by the fact that while 78% of the respondents agreed that the integrated market will exacerbate hazardous waste problems at the EC and national levels, only 56% agreed that policy harmonization might reduce these problems. Another important finding from the survey is the convergence of responses according to countries instead of political groups; this again shows that national priorities play a very decisive role in the EC political process.

The survey has shown a gap between the way policy makers see the obstacles to policy harmonization and the solutions they propose. Although conflicts among interest groups are seen to be the cause of limited progress in policy harmonization, not one of the solutions provided is meant to reconcile them. This result shows the difficulties that policy makers have in recognizing the importance of opening the policy process to interest groups, in spite of their acknowledgement that those conflicts have in fact caused past policy failure. I believe that hazardous waste minimization policies will not succeed until policy makers will change this attitude.

Figure 5.1

**Economic growth resulting from the
Single market will exacerbate
Hazardous Waste Problems**

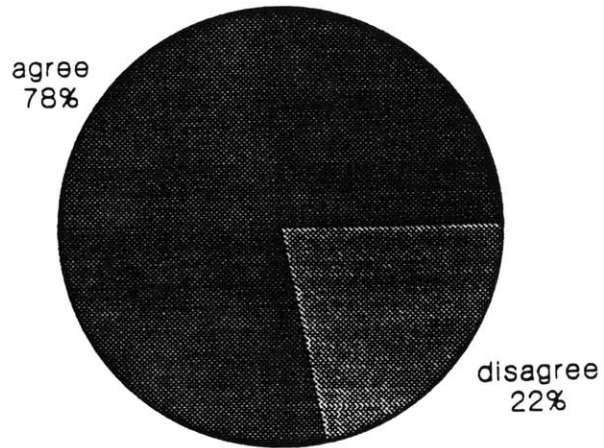


Figure 5.2

Most likely effects

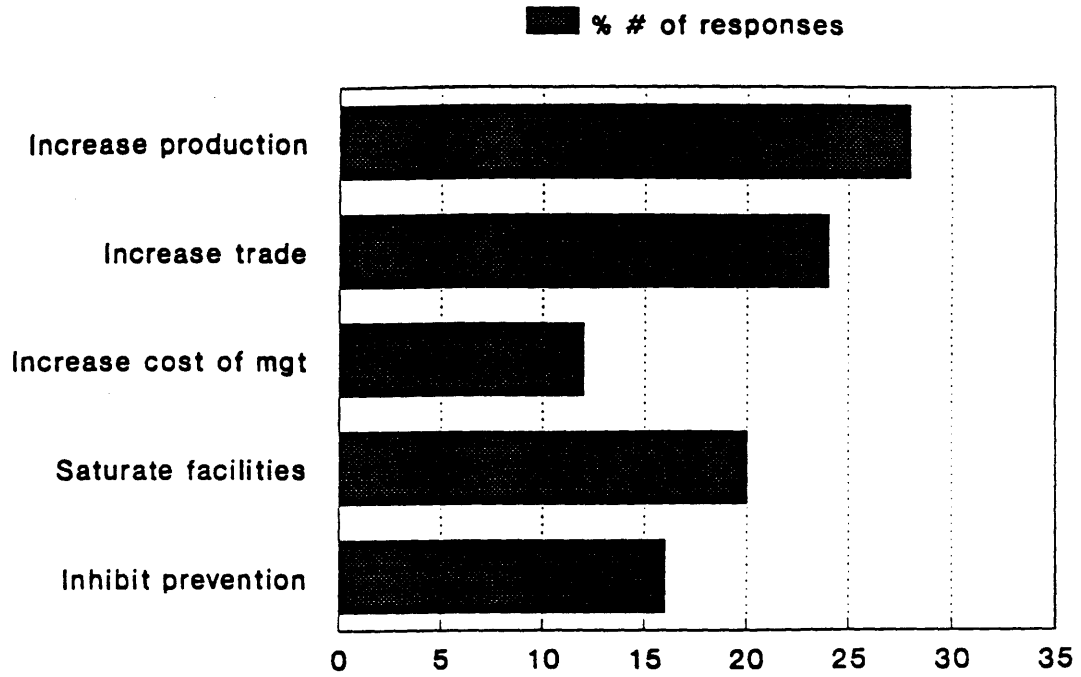


Figure 5.2A

Increase production of waste

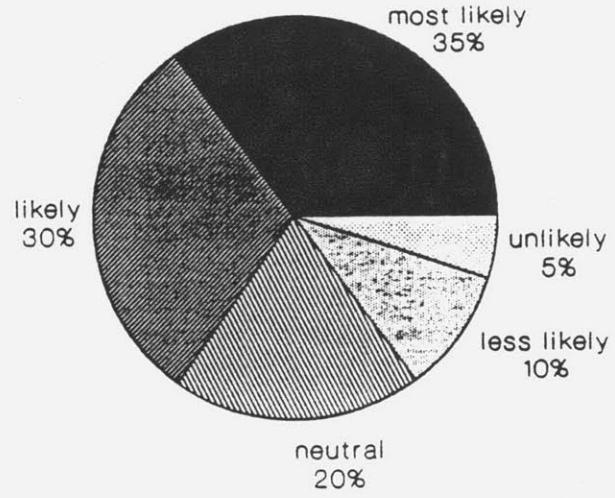


Figure 5.2B

Increase import/export of waste

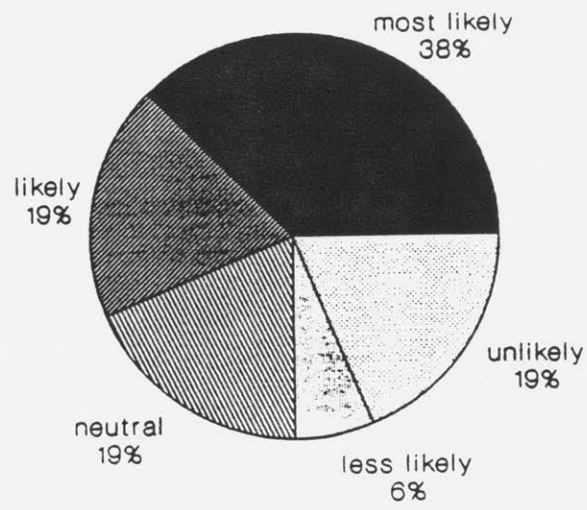


Figure 5.2C

Increase cost of waste management

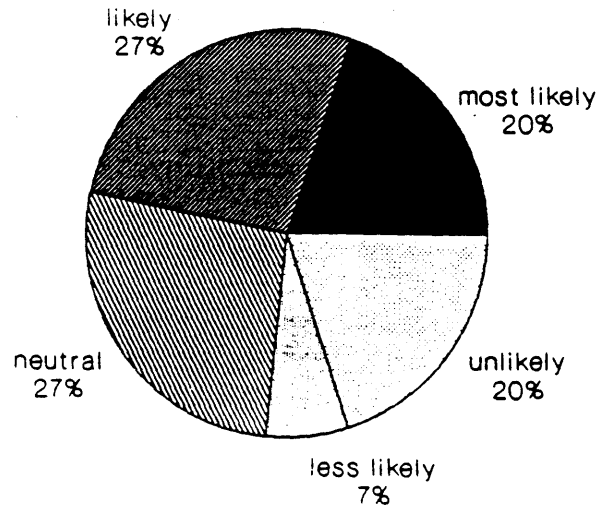


Figure 5.2D

Saturate existing waste facilities

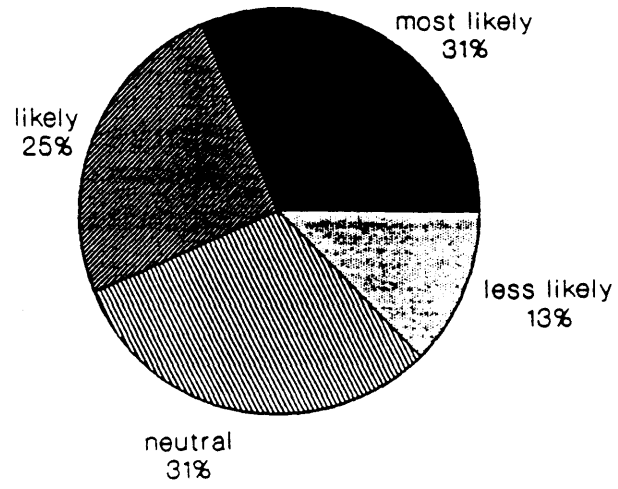


Figure 5.2E

Inhibit EC policy for waste prevention

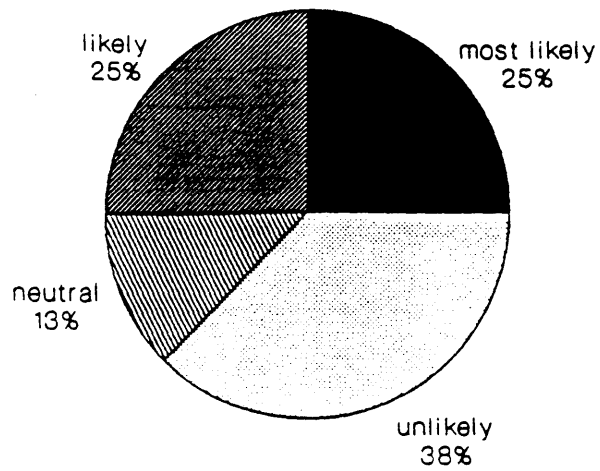
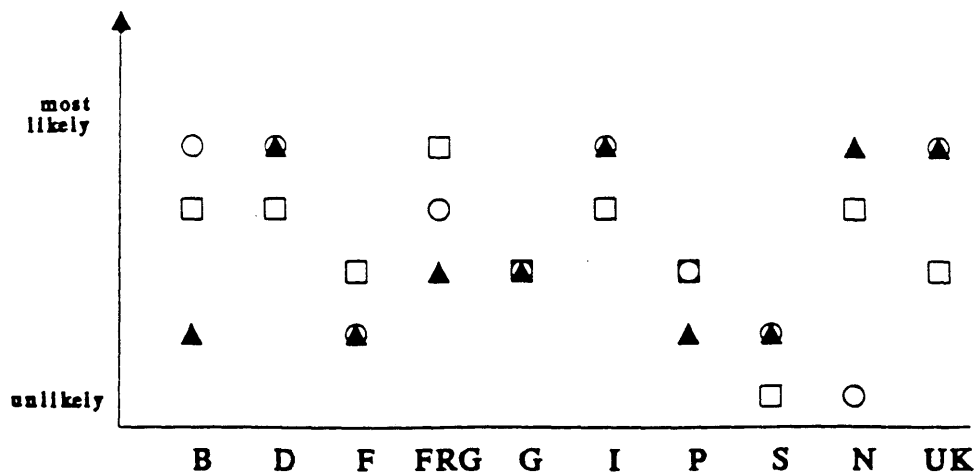


Figure 5.3

Effects by Countries



- increase waste production
- increase export/import
- ▲ saturate existing facilities

Figure 5.4A

**Impact of the single market on national hazardous waste policies:
waste prevention**

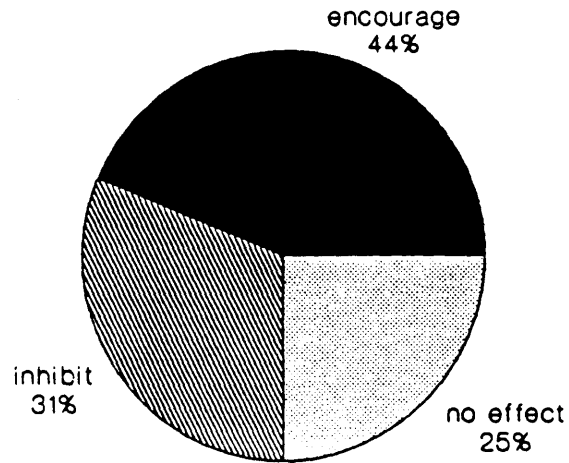


Figure 5.4B
Impact of the single market on national
hazardous waste policies:
waste recycling

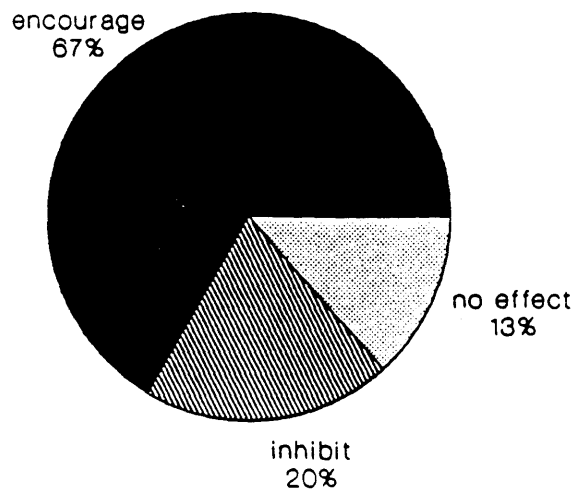


Figure 5.4C

**Impact of the single market on national hazardous waste policies:
safe treatment and disposal**

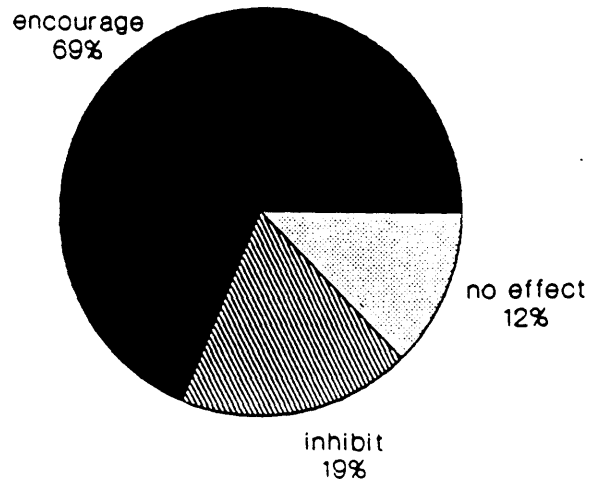


Figure 5.4D

**Impact of the single market on national hazardous waste policies:
control over export/import**

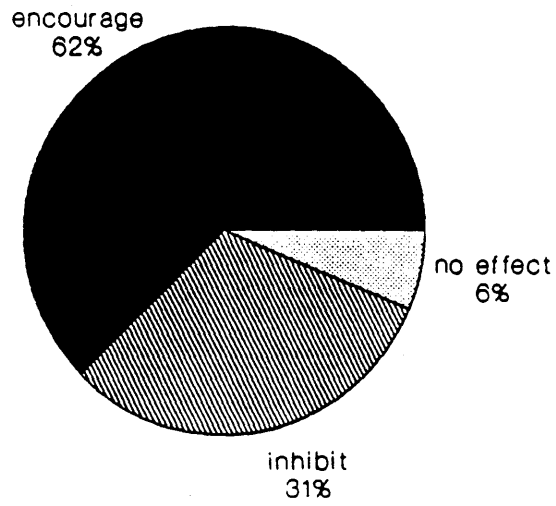


Figure 5.5

**Harmonization of national regulations
reduce the effects of market integration
on hazardous waste management**

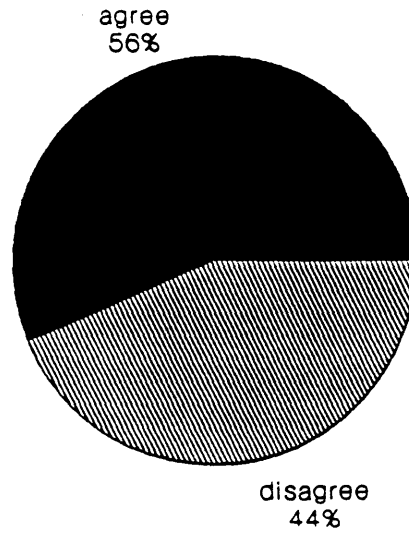


Figure 5.6

Most appropriate approach to achieve policy harmonization

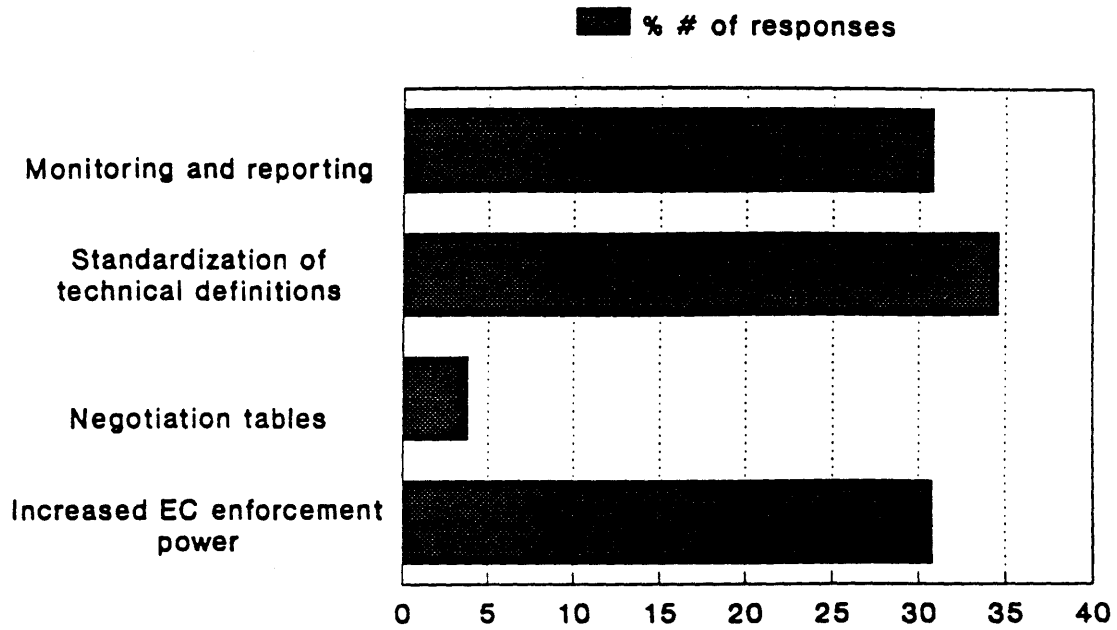


Figure 5.7

Obstacles to policy harmonization

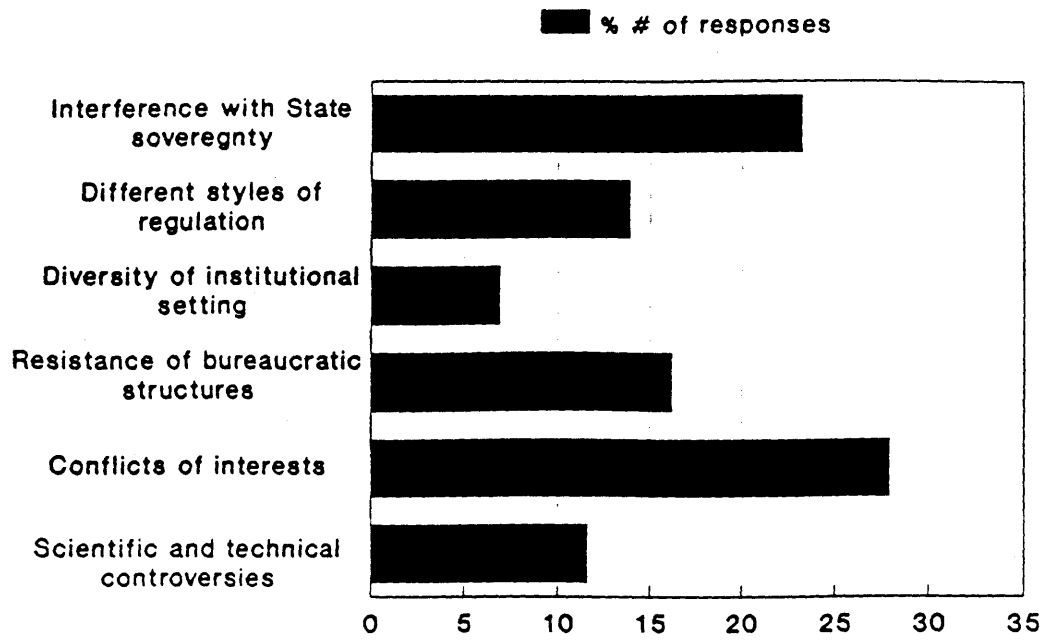


Figure 5.7A

**Obstacles to policy harmonization:
interference with state sovereignty**

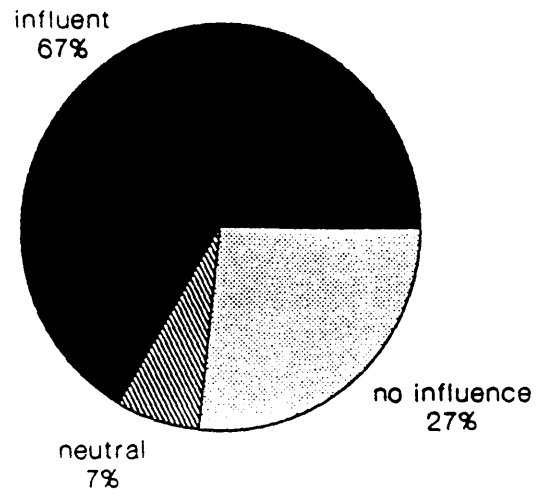


Figure 5.7B

**Obstacles to policy harmonization:
different styles of regulation**

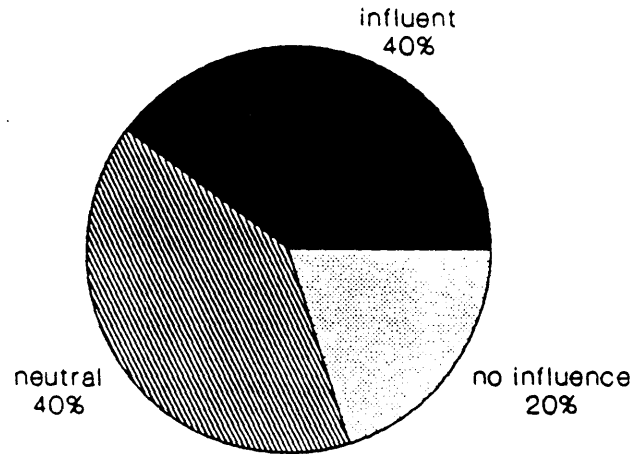


Figure 5.7C

**Obstacles to policy harmonization:
diversity of institutional settings**

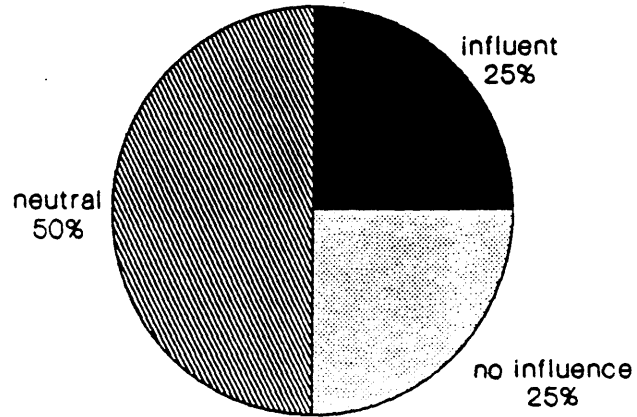


Figure 5.7D

**Obstacles to policy harmonization:
resistance of bureaucratic structures**

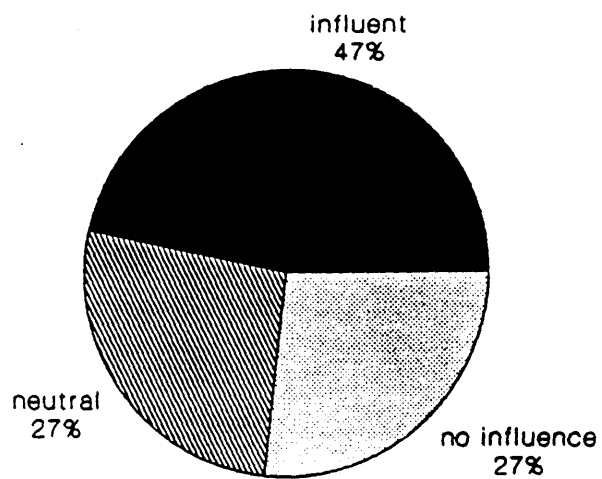


Figure 5.7E

**Obstacles to policy harmonization:
conflicts of interests**

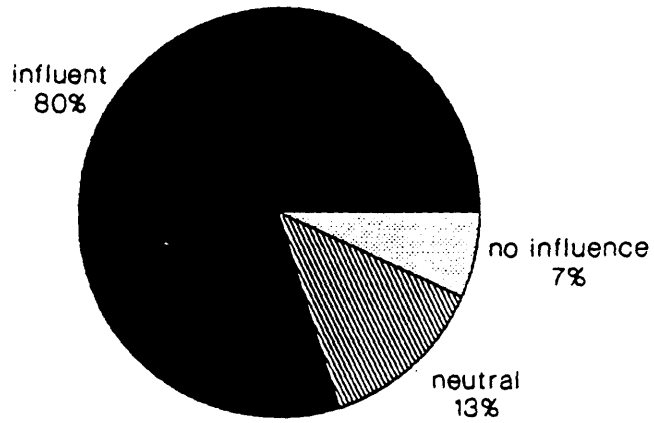


Figure 5.7F

**Obstacles to policy harmonization:
scientific and technical controversies**

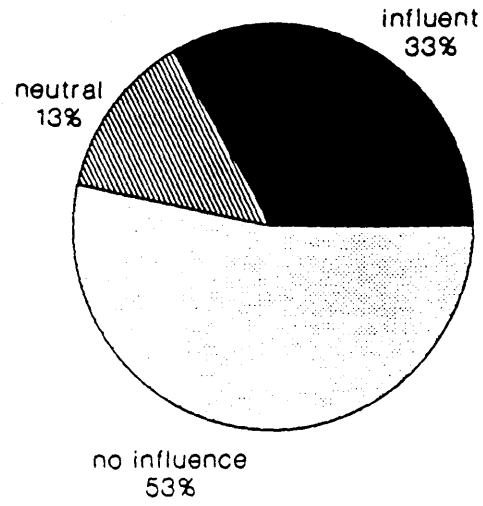
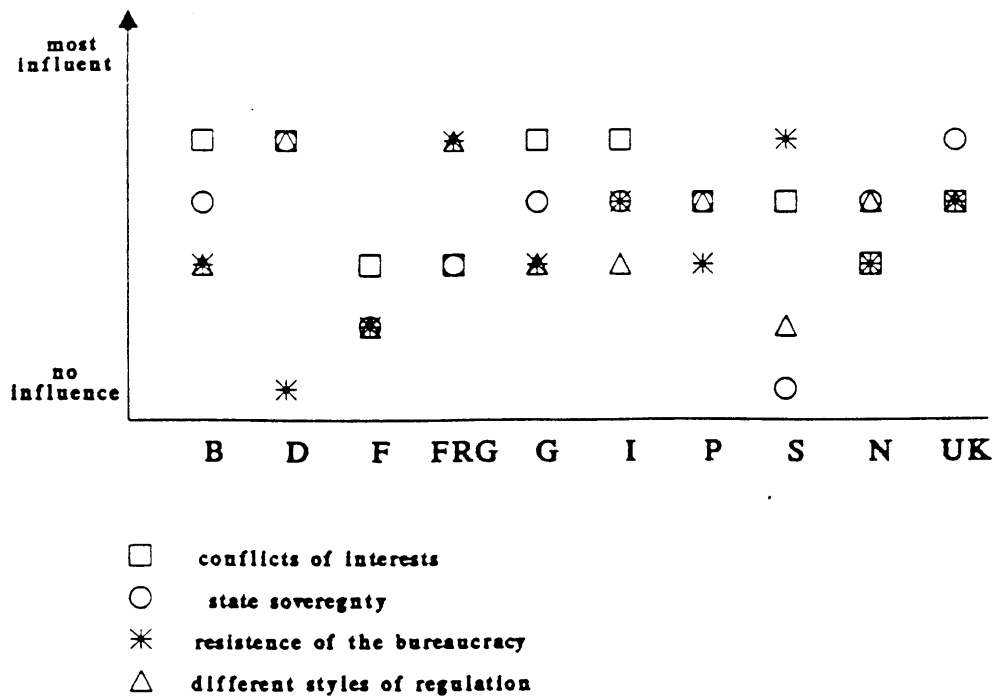


Figure 5.8

Obstacle to harmonization by Countries



CONCLUSIONS

The focus of this dissertation has been the gap between the intended and actual impact of European public policies aimed at minimizing hazardous waste. Similar implementation patterns of hazardous waste minimization policies emerge in Germany, Italy, the Netherlands and the UK. These countries have failed to achieve minimization of hazardous waste, despite striking differences in how each country has pursued this goal. The aim of this dissertation has been to search for key factors that could explain these outcomes.

National policies aimed at minimizing hazardous waste are seen to fail due to disagreement among the parties involved in the implementation process on the measures to be adopted. Industry opposes tight standards because of the additional costs they impose on production processes and the management of their hazardous residuals. The public is concerned with the risk that hazardous waste may pose and therefore puts pressure on national governments to adopt more stringent regulations. Governments are concerned to respond to public concerns without weakening their economic position.

Loopholes in regulations, which allow industries to escape controls, reflect the conflicts among these interests and the failure of public agencies to resolve them during the policy-making process. Once regulations are enacted, the conflicts simply reemerge during implementation. The responses of target groups which oppose regulations and are not directly involved in policy-making range from non-compliance to explicit obstruction. Three key issues are at the center of these conflicts: the tradeoffs between economic development and environmental protection, the balance of risks against economic costs, and the distribution of costs among different groups, geographic regions and human generations.

The environment versus development tradeoff determines to what extent hazardous waste can be prevented given current social, economic and technological constraints. Disagreement exists among different groups on the factors and the time-frame to be considered in making this trade-off. If seen in the short term, the costs of environmental protection are considered to slow down economic development. In the long run, however, protecting the environment has been proven to reduce the costs and improve both the efficiency of resource use and the quality of development. How much current production and consumption processes need to be changed to meet sustainable development is a complex question which involves scientific, political and ethical issues.

The different interests, values and perceptions among the actors involved in hazardous waste issues are reflected in the dispute on the balancing of the environmental risks against the economic costs of waste management. Disagreement exists concerning the ingredients to be considered in the equation. The uncertainty surrounding the environmental and health effects of hazardous substances adds to this controversy, making it impossible to estimate the costs and benefits of the different waste management options. Moreover, the way in which these costs and benefits must be distributed among different groups poses equity versus efficiency choices.

POLICY IMPLEMENTATION

Hazardous waste minimization policies in Europe rely on the mechanisms for internalizing the environmental costs put in place by the adoption of stringent standards for the management of hazardous waste. These policies are based on the assumption that effective control of all stages of the hazardous waste life-cycle is attainable so that stringent standards on the management of hazardous waste will inevitably lead industries to produce less hazardous waste.

Case studies in Germany, Italy, the Netherlands, and the UK show,

however, that tighter standards do not measure the extent to which these countries have achieved minimization of hazardous waste. Higher costs for the treatment and disposal of hazardous waste resulting from stringent regulations, coupled with loopholes in regulations, have resulted in the increased export of such waste to less regulated countries, thus thwarting national efforts to minimize hazardous waste. Discrepancies across national hazardous waste control systems and the stringency of standards contribute to undermining the impact of these efforts.

The vast uncertainty surrounding hazardous waste issues also makes effective control of the waste life-cycle simply unattainable, unless the different actors involved agree on the goals to pursue. Varying rules apply to hazardous waste under different circumstances (i.e. country of origin and country of final destination). Different values are attributed to hazardous waste by different actors (i.e. generators, transporters, disposers). These actors behave according to their different interests and values. Conflicts of interest which were not considered while setting policy objectives and strategies are likely to emerge during the implementation process, thus inhibiting its success.

My findings point out that public policies have so far overlooked the complex realities and conflicts involved in achieving minimization of hazardous waste. This is particularly evident from the separation which is maintained between the various stages of policy making and the downstream access of target groups to the policy-making process. Different patterns of implementation in Germany, Italy, the Netherlands, and the UK can be analyzed according to the way in which these countries structure the relationships between policy formulation and implementation.

Of particular importance in understanding these patterns is the way public agencies in these countries handle conflicts among economic, political, and social actors in establishing measures to regulate hazardous waste. The success of the recent Dutch policy in setting minimization targets for priority waste streams can be traced to the involvement of the interest groups in the process of drafting these measures and on the ability of the Dutch public agencies to resolve these conflicts.

In light of these findings, five policy options to achieve hazardous waste minimization were examined: (1) increasing non-regulatory incentives with no changes in the current regulatory frameworks; (2) tightening emission- and effect-oriented regulations; (3) prohibiting waste export; (4) setting waste minimization targets for specified waste streams; and (5) banning the use of hazardous chemicals from production processes.

It is clear from current patterns of transfrontier movement of hazardous waste that as long as will be possible for European countries to export their hazardous waste to less regulated countries, neither economic incentives nor more stringent hazardous waste management standards are likely to affect the production of hazardous waste. Export of hazardous waste from these countries is in fact a more competitive option than waste minimization. Hazardous waste trade across countries inherently runs counter to policy for waste minimization.

Therefore, the phase-out of hazardous waste movement across countries is essential if hazardous waste minimization is to rely on the mechanisms that aim to internalize pollution costs. In fact this option would allow public agencies to control the hazardous waste life-cycle and effectively implement their policies within the national boundaries. The alternative of controlling hazardous waste

movement under the rules of the Basel Convention would not be sufficient since it would fail to internalize the environmental and social costs.

On the other hand, the phase-out of hazardous waste movement would not be so crucial if national hazardous waste policies were to rely on more direct measures aimed at minimizing hazardous waste. These measures include the setting of minimization targets for priority substances and waste streams and the establishment of implementation plans and deadlines by cooperation with industrial sectors. Success in implementing measures aimed at minimizing hazardous waste depends on the participation of social, economic and political actors in drafting these measures and on the ability of European public agencies to resolve these conflicts.

POLICY HARMONIZATION

The success of any nation's efforts to minimize hazardous waste is seen to be strongly influenced by the policies of other countries. One of the major challenges facing the implementers of hazardous waste policy is the highly integrated worldwide market in chemical production and waste management. In Europe, the creation of a single market will exacerbate this interdependence and lead to new conflicts. Increased tension among countries willing to adopt different waste minimization strategies is likely to emerge. Thus, the harmonization of European policies is crucial for achieving the minimization of hazardous waste.

Three key factors affect the chances that policy harmonization across European countries will succeed. The first is the extent to which environmental

considerations affect the process of market integration. The second is the influence of distributional considerations in the allocation of costs and benefits. The third is the extent to which countries are willing to forego their national prerogatives in favor of cross-national priorities.

The limited progress in establishing a common framework for the management of hazardous waste can be traced to the disagreement among countries regarding the choices to be made. The varying attitudes of European countries toward policy harmonization reflect the different trade-offs made by interest groups at the national level and by member states at the European level, particularly when balancing national and cross-national priorities.

Three policy options were considered: (1) no harmonization; (2) harmonization of partial aspects of environmental policies; and (3) complete harmonization. If countries maintain their current differences in hazardous waste policies and regulations, the market distortion which results will, in fact, conflict with the objective of completing the internal market. However, the counter-forces governing the process of completing the single market might obstruct the harmonization process to the extent that substantial differences will remain after the deadline set for completing the internal market. If so, this conflict is likely to increase the tension between member states willing to adopt more stringent measures and those willing to maintain more flexible ones. This increased tension will induce several member states to act on an individual basis in order to achieve their desired level of environmental quality.

Complete harmonization of hazardous waste regulations, on the other hand, is not achievable given that member states intend to maintain their full autonomy in establishing national environmental policies and priorities, while

complying with the measures set out in the Single European Act. According to this act, a member state's autonomy in environmental matters is limited only under circumstances where it obstructs the full functioning of the market and does not comply with minimum environmental standards set by the Community. The principle of shared responsibility set out under the Single European Act establishes that environmental decision-making is accorded to the lowest appropriate level of governmental authority. Thus, it limits EC environmental policy to those environmental objectives which can be better attained at Community level.

The harmonization of specific aspects of environmental policies is thus the most likely option. However, the approach to harmonization that will be adopted, whether driven by economic or environmental considerations, is crucial to its outcome. The level of harmonization likely to be achieved and the particular aspects of environmental regulation involved depend on the tradeoffs which will be made by member states and on the ability of the Community to direct this process. The range of interests and tradeoffs involved in environmental decision making is unevenly affected by different aspects of regulations, which suggests that the chances for policy harmonization vary considerably among sectors and instruments of environmental policy.

If harmonization is driven only by economic considerations, hazardous waste regarded as products will be regulated to conform to specific technical standards, though the treatment and disposal standards will still vary across national boundaries. This will encourage waste generators to export their waste to countries with less stringent regulations. Furthermore, in the absence of a common regulatory framework for industrial processes, member states which are willing to adopt more stringent measures will suffer from competitive economic

disadvantages and from the fact that their hazardous waste minimization policies will be undermined.

Environmental considerations must enter into the process of policy harmonization in order to ensure that the requirement for a high level of protection set by the Single European Act will be translated into a common framework for regulating hazardous waste. This implies harmonization of technical definitions and of environmental standards for managing hazardous waste throughout the Community. It also implies reaching agreement on common targets for minimizing hazardous waste. The EC must develop new tools to cope with the diversity of national perspectives and with the conflicting interests among economic and political actors within and across member states.

IMPLICATIONS

A major implication of this dissertation's findings is a new definition of the hazardous waste management problem which acknowledges the plurality of agents, interests, and strategies involved at the national and international levels. Several reforms are needed to transform this definition into practical actions by national governments and by the EC to improve the chance of minimizing hazardous waste: (1) expanding the participation of all interest groups in setting these measures; (2) identifying priority waste streams and setting minimization targets; (3) involving the scientific community in order to ensure that important scientific uncertainties concerning the risks are considered; and (4) linking waste minimization policies into economic and development policies.

1. Involving interest groups in the policy-making process

The participation of interest groups in setting hazardous waste minimization measures is crucial for the success of implementation of these measures. It indeed provides the process with important insights into the key issues of the disputes which will otherwise undermine effective implementation. It will also help to explore the options and make trade-offs. Finally, it will increase the credibility of the process as well as the commitment of interest groups to implementing the established measures.

While national governments are the only actors recognized as having the power to represent national interests, a broader participation of national and international interest groups at the EC level could improve the quality and implementability of European hazardous waste minimization policies and the chance of achieving harmonization.

Different forms and roles of participation must be considered in redesigning participation processes to set these policies at the national and European Community levels. Approaches that include negotiation and consensus building processes could be institutionalized in drafting national and EC policies and regulations.

2. Identifying priority waste streams and setting minimization targets

Hazardous waste issues are specific and complex by their nature. Different hazardous waste streams originate from a heterogeneous range of activities. Their potential for reduction varies according to various economic and technological constraints. They also pose different levels of risk. Different interest groups are

have particular interest in the decision regarding the various hazardous waste streams.

Setting priorities and reduction targets for selected waste streams seems essential to ensure implementation of hazardous waste minimization measures. The wide range and diversity of activities which give rise to the production of hazardous waste and of agents involved in the waste life cycle indicate the need for diversified regulatory and economic instruments. Such flexibility is also required to face different levels of progress in the development of alternatives.

3. Integrating science and politics

Scientific controversy and uncertainties surrounding the risks that hazardous substances may pose have relevant implications for the successful implementation of hazardous waste minimization policies. In fact, policy decisions must be made before scientific controversies are resolved and evidence of cause-effect relationships provided. The disputes over hazardous waste are particularly affected by the current separation between scientific assessment and policy decisions because of the enormous uncertainty surrounding the health and environmental effects of chemicals. Appropriate forum to allow interaction between scientists, policy makers and interest groups in the process of setting priorities and targets could allow them to draft several scenarios and assess the options in the light of the existing uncertainties.

Integration of scientific expertise in the policy-making process could also ensure that monitoring systems are developed on the basis of a selected set of scientific indicators in order to detect adverse effects of hazardous substances. It should also ensure that the measures adopted include mechanisms to allow

recalibration of standards and targets on the basis of new evidence provided by scientific research and monitoring activities.

4. Linking waste minimization policies with economic and development policies

One of the key questions in the conflict between environmental protection and economic development stems from a narrow view of economic prosperity and competitiveness at national and international levels. Environmental policies have been shaped by the perceived opposition between environment and development. This opposition is reflected in the current separation of environmental policies from economic and development policies. But economic and ecological concerns are not necessarily in opposition. For example, a policy that increases the efficient use of energy and materials can also reduce economic costs. However, the interconnections between economic development and environmental protection are not reflected in the way in which policies are made. Hazardous waste minimization policies tend to deal with one waste stream or activity generating such a waste in isolation from the complex cycle of production and consumption in which it falls. Moreover, they fail to recognize the interdependence with other policy sectors.

Waste minimization at the source can be best achieved by identifying which mechanisms of economic development and consumption behavior lead to increased production of hazardous wastes and impede their reduction and recycling. This implies linking environmental policy in economic and sectoral policies. These and other linkages can provide the parties involved in the controversies on hazardous waste with a wide range of options to explore and with the opportunity to find creative solutions to conflicts.

REFERENCES

- Abbou R. (ed.), 1988. Hazardous Waste Detection, Control, Treatment. Amsterdam: Elsevier Science Publishers B. V.
- Allessie M.M.J. "An approach to the prevention and recycling of waste." UNEP Industry and Environment, January-March 1989 (pp. 25-29).
- Allison, Graham, 1971. Essence of Decision. Boston: Little, Brown and Co.
- Ashford N.A. and G.R Heaton, 1983. "Regulation and Technological Innovation in the Chemical Industry." Law and Contemporary Problems, Vol. 46.
- Association of German Industries (BDI), 1990. "Economic Instruments in Environmental Protection." Extract published in Environmental Policy and Law, 20:4-5, 1990.
- Bardach, Eugene, 1977. The Implementation Game: What Happens After a Bill Becomes a Law. Cambridge: MIT Press.
- Bardaracco, Joseph, 1985. Loading the Dice: a Five-Country Study of Vinyl Chloride Regulation. Boston: Harvard Business School Press.
- Bartels, J. de Bruin W. and F. de Walle. "An Information System for the Control of Transfrontier Shipments of Hazardous Wastes in Europe." Waste Management & Research Volume 7, No. 1, March 1989. pp. 1-11.
- Berger, Peter and Thomas Luckman, 1967. Social Construction of Reality: A Treatise in the Sociology of Knowledge. New York: Doubleday.
- Brickman, Ronald, Shiela Jasanoff and Thomas Ilgen, 1985. Controlling Chemicals - The Politics of Regulation in Europe and the United States. New York: Cornell University Press.
- Briggs, David, "Environmental Issues and Policies in the European Community." The Planner TCPSS Proceedings, 13th December, 1991, London.
- Brown, Jennifer, (ed.), 1989. Environmental Threats, Perception, Analysis, and Management. London, ESRC, Belhaven Press.
- Bureau International de la Recuperation, 1980. Handbook for the International Reclamation Bureau. Brussels, BIR.
- Caldart, Charles C. and C. William Ryan. "Waste Generation Reduction: A First Step Toward Developing a Regulatory Policy to Encourage Hazardous Substance Management through Production Process Change." Hazardous Waste &

Hazardous Materials, Volume 2, No. 3, 1985.

Caldwell, Lynton K., 1984. International Environmental Policy: Emergence and Dimensions. Durham, North Carolina: Duke University Press.

Callingaert, Michael, 1988. The 1992 Challenge from Europe: Development of the European Community's Internal Market. Washington, D.C.: National Planning Association.

Cecchini, P., 1988. The European Challenge 1992. Aldershot, UK: Wildwood House.

Clark, William C. Conflict and Ignorance in Scientific Inquiries With Policy Implications Paper, Kennedy School of Government, Harvard University, July 1988.

Cohen, J. and J. Rogers, 1983. On Democracy. Baltimore: Penguin Books.

Commission of the European Communities, Task Force on the Environment and the Internal Market, 1990. "1992" The Environmental Dimension. Brussels, Belgium.

Conseil Europeen des Federations de l'industrie chimique (CEFIC), 1987. "Industrial Waste Management: A CEFIC approach to the Issue." Bruxelles: CEFIC.

Crandall and Lave, 1981. The Scientific Basis of Health and Safety Regulations. Washington, D.C.: Brookings Institute.

Crozier. The Bureaucratic Phenomenon.

Davis, A. Gary, "Waste Reduction Strategies: European and American Policy and Practice." In R. Abboud (ed.), 1988. Hazardous Waste: Detection, Control, Treatment. Amsterdam: Elsevier Science Publisher B.V.

Davis, E. Charles and James P. Lester (eds.), 1988. Dimensions of Hazardous Waste Politics and Policy. New York: Greenwood Press.

Deziron, Mireille and Leigh Bailey, 1991. A Directory of European Environmental Organizations. Oxford, UK: Blackwell Publishers.

Docter, 1987. European Environmental Yearbook. London: Docter International.

Docter, 1990. European Environmental Yearbook. London: Docter International.

Douglas, Mary and Aaron Wildavsky, Risk and Culture Berkeley: University of California Press.

Douglas, Mary, 1986. How Institutions Think. Syracuse, NY: Syracuse University Press.

Downing P. and Hauf K. (eds.), 1983. International Comparison in Implementing Pollution Laws. Boston: Kluwer-Nijhoff.

Duncan, Lawrence and Brian Wynne. "Transportation Waste in the European Community: A Free Market?" Environment Volume 31, No. 6, July/August 1989.

Edelman, Murray, 1964. The Symbolic Uses of Politics. Urbana, IL: University of Illinois Press.

Emerson M. et alii, 1990. The Economics of 1992. The E.C. Commission's Assessment of the Economic Effects of Completing the Internal Market. New York: Oxford University Press.

Eurobarometre No 31.

Fisher, Frank, 1980. Politics, Value and Public Policy: The problem of Methodology. Boulder, Co: Westview Press.

Forester, William S. and John H. Skinner (eds.), 1987. International Perspectives on Hazardous Waste Management. ISWA Academic Press.

Gardner, L., and D. Huisingh, 1987. "Waste Reduction through Material and Process Substitutions: Progress and Problems Encountered in Industrial Implementation", Hazardous Waste and Hazardous Materials, Vol. 4, No. 1, pp. 23-33.

Geiser, Kenneth, 1985. "A Policy Assessment of European Hazardous Waste Treatment Facilities." Hazardous Waste & Hazardous Materials, Volume 2, No. 3, pp. 363-380.

Greenpeace International, 1990. The International Trade in Waste. Washington D.C.: Greenpeace USA.

Greenpeace International, 1990. "The Need for a European Waste Prevention Strategy." Paper by Ernest R. Klatte for the STOA Workshop on "Hazardous Waste Prevention," 25-26 January 1990, Brussels.

Gusfield, Joseph R., 1981. The Culture of Public Problems. Chicago: University of Chicago Press.

Guyer, S., and D. Roe, 1986. Approaches to Source Reduction: Practical Guidance from Existing Policies and Programs. Berkeley, California: The Environmental Defense Fund.

Haigh N. and Irwin F. (eds.), 1990. Integrated Pollution Control. The Conservation Foundation.

Haznews No. 44 November, 1991.

Henig, R., 1985. Public Policy and Federalism. New York: St. Martin's.

Higgins, Thomas (ed.), 1989. Hazardous Waste Minimization Handbook. Lewis Publishers.

Hilz, Christoph and John R. Ehrenfeld, 1991. "Transboundary Movements of Hazardous Wastes." International Environmental Affairs, Volume 3, No. 1, Winter 1991.

Hirshman, O., 1982. Shifting Involvement : Private Interest and Public Action. Princeton, NJ: Princeton University Press.

Huisingh, D., 1989. "Cleaner technologies through process modifications, material substitutions and ecologically based ethical values." UNEP Industry and Environment, January-March 1989 (pp. 4-8).

Huisingh, D., et al, 1986. Proven Profits from Pollution Prevention: Case Studies in Resource Conservation and Waste Reduction. Washington, D.C.: The Institute for Local Self-Reliance.

Huising, D. and V. Bailey (eds.), 1982. Making Pollution Prevention Pay. New York: Pergamon Press.

Hynes, Patricia, 1989. The Recurring Silent Spring. New York: Pergamon Press.

Institute for European Environmental Policy, Annual Report 1981. Bonn: IEEP.

International Institute for Applied Systems Analysis (IIASA), 1989. Conflicting Objectives in Decisions. IIASA.

Jasanoff, Shiela, 1986. Risk Management and Political Culture. Beverly Hills: Sage.

Kaiser H., 1989. "The Market for Waste Disposal in West Germany and Western Europe up to the Year 2000." In Karl J. Thome-Kozmiensky (editor), Recycling International, Volume 1, EF-Verlag fur Energie-und Umwelttechnik GmbH.

- Kellman, Steve, 1987. Making Public Policy. New York: Basic Books.
- Kelman, Steve, 1984. What Price Incentives: Economists and the Environment. New York: Praeger.
- Keeney, Ralph L. and Raiffa, Howard, 1976. Decision with Multiple Objectives: Preferences and Value Tradeoffs. New York: Wiley.
- Kingdon, John, 1984. Agendas, Alternatives and Public Policies. Boston: Little, Brown and Co.
- Kneese, Allen V. and Charles Schultze, 1975. Pollution, Prices, and Public Policy. Washington, D.C.: Brookings Institution/Resources for the Future.
- Kramer L., 1989. "Monitoring application of Community Directives on the Environment".
- Kuhn, Thomas, 1970. The Structure of Scientific Revolutions. Chicago: University of Chicago Press.
- Lave, Lester B., 1981. The Strategy of Social Regulation. Washington, D.C.: Brookings Institution.
- Lave, Lester B., and Arthur C. Upton (editors), 1987. Toxic Chemicals, Health, and the Environment. Baltimore: The Johns Hopkins University Press.
- Lawrence, D. and B. Wynne. "Transportation Waste in the European Community: A Free Market?" Environment Volume 31, No. 6, July/August 1989.
- Lega per l'Ambiente, 1991. L'Ecosistema Rifuti. (a cura di E. Guazzoni). Milano, Italy: HOEPLY.
- Lester J.P. (editor), 1989. Environmental Politics and Policy. Duke University Press.
- Lindblom, Charles, 1977. Politics and Markets. New York: Basic Books.
- Lindblom, Charles, 1968. The Policy Making Process. Englewood Cliffs, NJ: Prentice-Hall.
- Lipsky, Michael, 1980. Street Level Bureaucracy. New York: Russel Sage.
- Liroff, Richard, 1982. Cost Benefit Analysis and Environmental Regulations: Politics, Ethics, and Values.
- Long, L. William. "Economic aspects of transport and disposal of hazardous

- waste." Marine Policy, Volume 14, No. 3, May 1990.
- Lowi, Theodore, 1969. The End of Liberalism. New York: Norton.
- Majone, Giandomenico, 1988. Evidence, Argument and Persuasion: Analysis of the Policy Process. New Haven: Yale University Press.
- Majone, Giandomenico and Aaron Wildavsky, 1978. "Implementation as Evolution." Policy Studies Review Annual 2.
- Marris, Peter and Martin Rein. Dilemmas of Social Reform
- Marris, Peter, 1971. Loss and Change. New York: Pantheon.
- Mazmanian, D & J. Nienaber, 1979. Can Organizations Change? Washington D.C.: Brookings Institution.
- Mazmanian, Daniel and Paul Sebatier, 1983. Implementation and Public Policy. Chicago: Scott, Foresman, and Company.
- McAllister, Donald M, 1986. Evaluation in Environmental Planning. Cambridge: MIT Press.
- Ministry of Housing, Physical Planning and Environment, the Netherlands, 1990. "National Environmental Policy Plan Plus" (NEPP-P).
- Murillo, Matilla E., 1989. "Clean technologies policy of the European Economic Community." UNEP Industry and Environment, January-March 1989 (pp. 11-13).
- National Research Council, 1985. Reducing Hazardous Waste Generation. Washington, D.C.: National Academy Press.
- National Research Council, 1982. Risk and Decision Making: Perspective and Research. Washington D.C.: U.S. National Academy of Sciences.
- National Research Council, 1983. Risk Assessment in the Federal Government: Managing the Process. Washington D.C.: National Academy of Sciences.
- Nerb G., CEC Directorate-General for Economic and Financial Affairs, 1987. The completion of the internal market: A survey of European industry's perception of the likely effects. Brussels: Commission of the European Community.
- O'Hare, Michael and Larry Bacow, 1983. Facility Siting and Public Opposition. New York: Van Nostrand and Reinhold.
- O'Riordan, Timothy, 1976. Environmentalism. London: Pion Limited.

Office of Science and Technology Policy (OSTP). "Chemical Carcinogens: A Review of the Science and Its Associated Principles." Federal Register No. 50, 10371-104429, March 14, 1985.

Office of Technology Assessment, 1981. Assessment of Technologies for determining Cancer Risks from the Environment, OTA 81-600081 Washington, D.C.: U.S. Government Printing Office.

Office of Technology Assessment, 1987. From Pollution to Prevention. A Progress Report on Hazardous Waste Reduction. Washington, D.C.: Congress of the United States, OTA-ITE-347.

Olson, Mancur, 1965. The Logic of Collective Action. Cambridge: Harvard University Press.

Ortolano, Leonardo, 1984. Environmental Planning and Decision Making New York: Wiley.

Ostrom, 1990, *Governing the Commons: the evolution of institutions for collective action*. Cambridge University Press, Cambridge (UK).

Otway, Harry and Malcol Peltu, (eds.), 1985. Regulating Industrial Risk. London: Butterworth.

Plasacki, B.W., and G.A. Davis, 1987. America's Future in Toxic Waste Management: Lessons from Europe. New York: Quorum Books.

Pressman, Jeffrey and Aaron B. Wildavsky, 1984. Implementation. University of California Press.

Quade, Edward, 1975. Analysis for Public Decisions. New York: Elsevier Science Publishing.

Ravetz, J.R., 1971. Scientific knowledge and its social problems. Oxford: Oxford University Press.

Rawls, John, 1971. A Theory of Justice. Cambridge: The Belknap Press of Harvard University Press.

Rehebinder, E. and Stewart R. (editors), 1985. Integration Through Law, Volume 2: Environmental Protection Policy. European University Institute. Berlin, New York: de Gruiter.

Ruckelshaus W.D., 1983. "Science, Risk, and Public Policy", Science, No. 221.

Ruckelshaus, W.D., 1984. "Risk in a Free Society." Issues in Science and

Technology, 4:157-62.

Sabatier, Paul, 1987. "Top-Down and Bottom-Up Approaches to Implementation Research: A Critical Analysis and Suggested Synthesis." Journal of Public Policy, Vol. 6, No. 1.

Sagoff, Mark, 1988. The Economy of the Earth. Cambridge, UK: Cambridge University Press.

Schultze, Charles L., 1977. The Public Use of Private Interest. Washington D.C.: Brookings Institution.

Shell International Petroleum Company Ltd, 1984. Environmental Brief, Waste Management.

Shelling, Thomas, (ed.), 1983. Incentives for Environmental Protection. Cambridge: MIT Press.

Smith, T. Turner and Pascale Kromarek, 1989. Understanding US and European Environmental Law London: Graham & Trotman/Martinus Nijhoff.

Smith, T.T. and L. Bergkamp. "Packaging Waste Developments in Europe." Int. Environ. Rep. Vol 14, No.19, 25 Sept., 1991, pp. 522-528.

Scientific and Technological Option Assessment (STOA), European Parliament, 1990. Hazardous Waste Prevention Preliminary Study. Brussels: EURECO.

Scientific and Technological Options Assessment (STOA), European Parliament, 1990. Hazardous Waste Project Summaries. Strasbourg: European Parliament.

Stokey, Edith and Richard Zeckhauser, 1978. Primer for Policy Analysis. New York: W.W. Norton.

Stone, Deborah, 1988. Policy Paradoxes and Political Reason. Boston: Scott, Foresman and Co.

Susskind, Lawrence and Jeffrey Cruikshank, 1987. Breaking the Impasse: Consensual Approaches to Resolving Public Disputes. New York: Basic Books.

Susskind, Lawrence and Louise Dunlap, 1981. "The Importance of Non-objective Judgments in Environmental Impact Assessment." EIA Review, 2(4): 335-336.

State Secretariat for Environment and Natural Resources (Portugal). "Dechets Toxiques et Dangereux." Report, 24 April 1987, Directorate-General of Environmental Quality, Portugal.

Taylor, Serge, 1984. Making Bureaucracies Think. Palo Alto, California: Stanford University Press.

Thompson Michael, 1990. "The Management of Hazardous Waste and the Hazard of Wasteful Management." In Hannah Bradby (ed.), Dirty words: Writings on the history and culture of pollution. London: Earthscan Publications.

Tolba, K. Mostafa (Executive Director, UNEP), 1990. "The global agenda and the hazardous waste challenge." Marine Pollution, Volume 14, No. 3, May 1990.

United Nations Conference on Environment and Development, Preparatory Committee. "Provisional agenda of Working Group II," Section 3 (Environmentally Sound Management of Wastes, particularly hazardous waste), A/CONF/151/PC/WG.II/L5.

U.S. National Research Council, 1985. Reducing Hazardous Waste Generation. Washington, D.C.: National Academy Press.

U.S. Office of Science and Technology Policy [OSTP]. "Chemical Carcinogens: A Review of the Science and Its Associated Principles," Federal Register, No. 50 10438-40, 1985.

Vickers, Geoffrey. Making Institutions Work.

Vogel, David, 1982. National Styles of Regulation: Environmental Policy in Great Britain and the United States. Ithaca, NY: Cornell University Press.

VROM/DGM, 1991. Project KWS 2000. Den Haag: Project Bureau of the Dutch KWS 2000 Project.

Weiss, Heinrich, 1991. "Making Market Forces Work to Improve the Environment." Extract from a paper delivered at the 2nd World Industrial Conference on Environmental Management (Rotterdam, April 10, 1991). Environmental Policy and Law, 21:3/4, 1991.

WICEM II Second World Industry Conference on Environmental Management, Rotterdam, 10-12 May 1991. Summaries of Working Sessions.

Wildavsky, Aaron, 1979. Speaking Truth to Power: The Art and Craft of Policy Analysis. Boston: Little, Brown.

Williams, Alan, 1987. "A Study of Hazardous Waste Minimization in Europe: Public and Private Strategy to Reduce Production of Hazardous Waste." Environmental Affairs Law Review (Boston College), Volume 14 no. 2, pp. 165-255.

Wilson, James Q. (ed.), 1980. The Politics of Regulation. New York: Basic Books.

World Commission on Environment and Development, 1987. Our Common Future. Oxford, UK: Oxford University Press.

Wynne, Brian, 1987. Risk Management and Hazardous Waste: Implementation and Dialectics of Credibility. Springer Verlag.

Yakovitz, Harvey. "Identifying, classifying and describing hazardous wastes." UNEP Industry and Environment January/February/March 1988, Vol. 11, No. 1.

Zirm, K. L. and J. Mayer (eds.), 1990. The Management of Hazardous Substances in the Environment. London and New York: Elsevier Applied Science.

STATISTICAL REPORTS

International

Commission of the European Communities (CEC), 1992. Report on the State of the Environment of the European Community.

Eurostat, 1989. Environmental Statistics. Commission of the European Communities, Luxembourg: Eurostat.

Organization for Economic Cooperation and Development (OECD), 1989. Environmental Data: Compendium 1989. Paris: OECD.

Organization for Economic Cooperation and Development (OECD) Environmental Data 1991. Paris: OECD.

Organization for Economic Cooperation and Development (OECD) State of the Environment Report 1991. Paris: OECD.

Organization for Economic Cooperation and Development (OECD), 1991. Environmental Indicators. Paris: OECD.

United Nations Environmental Program (UNEP), 1991/92. Environmental Data Report. London: UNEP, GEMS.

Germany

Federal Environmental Agency.

Italy

ISTAT, 1991. Statistiche Ambientali 1991. Roma: ISTAT.

Ministero per l'Ambiente, 1989. Relazione sullo Stato dell'Ambiente 1989. Roma: Ministero per l'Ambiente.

United Kingdom

UK Department of the Environment, 1990. Digest of Environmental Protection and Water Statistics, No. 13. London: HMSO.

The Netherlands

Central Bureau of Statistics (CBS), 1990. Environmental Statistics of the Netherlands. Den Haag: CBS.

Ministry of Housing, Physical Planning and Environment, 1991. Essential Environmental Information: The Netherlands. Den Haag: VROM.

REGULATION AND OFFICIAL DOCUMENTS*

EC Treaties

Council of the European Community, Single European Act. Official Journal of the European Communities No. 169, 29.06.1987.

EC Environmental Action Programs

Council of the European Communities, First Environmental Action Program 1973-1976, Official Journal (OJ) of the European Communities No. C 112 of 20/12/73.

Council of the European Communities, Second Environmental Action Program 1977-1981, Official Journal (OJ) of the European Communities No. C 139 of 13/6/1977.

Council of the European Communities, Third Environmental Action Program 1982-1986, Official Journal (OJ) of the European Communities No. C 46 of 17/2/83.

Council of the European Communities, Fourth Environmental Action Program, Official Journal (OJ) of the European Communities No. C 328, 7.12.1987.

Council of the European Communities, Fifth Environmental Action Program, Toward Sustainability,. (Draft, February 1992).

Council of the European Community Directives

Council Directive 75/442/EEC on Waste.

Council Directive 75/439/EEC on Waste Oils.

Council Directive 78/319/EEC on Toxic and Dangerous Waste. Official Journal No. L 84, 31.3.1978.

Council Directive 84/613/EEC on Supervision and Control within the European Community of the Transfrontier Shipment of Hazardous Waste. Official Journal No. L 362, 13.12.84.

* Regulations and Official documents are listed following publication date.

Council Directive 86/279/EEC. Official Journal No. L 181, 4.7.86.

Council Directive 91/156/EEC amending Council Directive 75/442/EEC on Waste. Official Journal No. L 78, 26.03.1991.

Council Directive 91/157/EEC on used batteries and storage batteries containing certain heavy metals. Official Journal No. L. 78, 26.03.1991.

Council Regulations

Council Regulation No. 1210/90 on the establishment of the European Environmental Agency and the European environmental information and observation network. Official Journal No. L 120 of 11 May 1990.

Council Regulation No. on a Community eco-label award scheme. Official Journal

EC Commission proposals for new Council Directives and Regulations

Commission of European Communities, "Proposal for a Council Directive on Civil Liability for Damage Caused by Waste." COM(89) 282 final - SYN 217. Brussels, 15 September 1989.

Commission of the European Communities, "Proposal for a Council Directive on Harmonizing and Rationalizing Reports on the Implementation of Certain Directives Relating to the Environment." COM(90) 287 final, Brussels, 26 July 1990.

Commission of the European Communities, "Proposal for a Council Regulation establishing a Financial Instrument for the Environment (LIFE)." COM(91) 28 Final, Brussels, 31 January, 1991.

Commission of the European Communities, "Proposal for a Council Directive on the Landfill of Waste." COM(91) 102 final - SYN 335, Brussels, 22 May 1991.

Commission of European Communities, "Amended proposal for a Council Directive on Civil Liability for Damage Caused by Waste." COM(91) 219 final - SYN217, Brussels, 27 June 1991.

Commission of the European Community, "Draft Proposal for a Council Directive on Packaging and Packaging Waste." Brussels, 1991.

Commission of the European Community, "Draft Proposal for a Council Directive on Incineration of Hazardous Waste." Brussels, 1991.

Commission of the European Community, "Draft Proposal for a Council Framework Directive on Integrated Pollution Control." Brussels, 1991.

EC Official Documents

EC Commission, 1985. "Completing the internal market." White Paper from the Commission to the European Council, Brussels.

Commission of the European Communities. "A Community Strategy for Waste Management." SEC (89) 934, Brussels, 18 September 1989.

Commission of the European Communities. "Report on the implementation by the Member States of the Community Waste Directives 75/442/EEC and 78/319/EEC" SEC(89) 1455, Brussels, 27 September 1989.

Commission of the European Communities. "Proposal for a new approach to prevention and recovery of specific waste streams," Manual of the Services of the Commission of the European Communities, September 1990.

APPENDIX A
SURVEY QUESTIONNAIRE

HARMONIZATION OF HAZARDOUS WASTE POLICIES IN EC COUNTRIES

QUESTIONS

1. In the view of some experts, the creation of the European Single Market in 1992 and the expected acceleration of economic growth in the European Community (EC) countries will exacerbate the problem of hazardous waste management.

1a. Do you agree or disagree? agree disagree

1b. Indicate which effects the EC Single Market will most likely have in the EC as a whole:

	Most likely				Unlikely
Increase production of waste	1	2	3	4	5
Increase import/export of waste	1	2	3	4	5
Increase cost of waste management	1	2	3	4	5
Saturate existing waste facilities	1	2	3	4	5
Inhibit EC policy for waste prevention	1	2	3	4	5
Other _____	1	2	3	4	5

1c. Indicate which of the following effects will most likely occur in your country:

	Most likely				Unlikely
Increase production of waste	1	2	3	4	5
Increase import/export of waste	1	2	3	4	5
Increase cost of waste management	1	2	3	4	5
Saturate existing waste handling capacity	1	2	3	4	5
Inhibit waste prevention	1	2	3	4	5
Other _____	1	2	3	4	5

1d. Please indicate your country:

Belgium	Denmark	FRG	France
Greece	Ireland	Italy	Luxembourg
Portugal	Spain	Netherlands	United Kingdom

4. Policy makers in the EC Member States suggest different approaches to achieve policy harmonization. In your view, which of the following approaches is the most appropriate?

	Most appropriate			Less appropriate	
	1	2	3	4	5
Monitoring and reporting systems					
Standardization of technical definition and standards					
Consensus-building processes and negotiation tables					
Increased enforcement power of the EEC					

5. What is the nature of the obstacles to policy harmonization:

	Most influent			No influence	
	1	2	3	4	5
Interference with state sovereignty					
Different styles of regulation					
Diversity of institutional setting					
Resistance of bureaucratic structure					
Conflict of interests					
Scientific and technical controversies					
Others _____					

Please add the name of your Parliamentary Group and (optional) your name.

Group _____

Name _____

Address _____

Tel _____ Fax _____