

ADVANCES IN CLEANER PRODUCTION

Biagio F. Giannetti
Cecilia M. V. B. Almeida
Silvia H. Bonilla
Editors

VOLUME

1



Environmental Remediation Technologies, Regulations and Safety

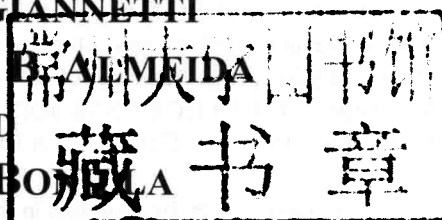
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ENVIRONMENTAL REMEDIATION TECHNOLOGIES, REGULATIONS AND SAFETY

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BIAGIO F. GIANNETTI
CECILIA M. V. B. ALMEIDA
AND
SILVIA H. BORDA
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Nova Science Publishers, Inc.

New York

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Additional color graphics may be available in the e-book version of this book.

LIBRARY OF CONGRESS CATALOGING-IN-PUBLICATION DATA

ISSN: 2159-936X

ISBN 978-1-61209-932-3

Published by Nova Science Publishers, Inc. † New York

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PREFACE

This book brings contributions from researchers that participated of the first and the second editions of the International Workshop Advances in Cleaner Production (www.advancesincleanerproduction.net) held in São Paulo, Brazil.

Cleaner Production is an emerging field of research that comprises concepts and methodologies from different disciplines in a problem-oriented manner. Research efforts are often concentrated in a variety of sectoral domains, and for understanding the global change, which embraces a variety of processes on several scales, a variety of environmental and sustainability aspects can be addressed. This book includes contributions from researchers from various countries for the development of Cleaner Production. Divided into three sections, the book addresses national experiences for the implementation of CP programs, research related to the metrics used to assess the effects of CP initiatives in the production sector and discussions that emerge before and after the implementation of these programs. Methodological approaches presented can be useful in the design and management of production systems, for policy development, environmental risk reduction, and prevention/mitigation strategies.

ACKNOWLEDGMENTS

The editors wish to thank the authors for their contributions and the financial support by CAPES, FAPESP, FINEP/CNPq, SABESP, SENAC, Banco do Brasil, and Paulista University that supported the 1st and the 2nd International Workshop Advances in Cleaner Production. Special thanks are addressed to Vice-Reitoria de Pos-Graduação e Pesquisa da UNIP (Paulista University) signatory of The International Declaration on Cleaner Production, a voluntary but public statement of commitment to the strategy and practice of cleaner production.

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Editors are professors of the Post-Graduate Program of Production Engineering at Paulista University and organizers of the International Workshop on Advances in Cleaner Production. The International Workshop (www.advancesincleanerproduction.net) is a biennial international forum held in São Paulo, Brazil, and has the aim to promote the exchange of academic information, the presentation of recent results on cleaner production concepts and practices, the discussion of common problems and their possible solutions in this area, and the increase of the contact among academic knowledge and corporative experiences.

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PART I. REPORTING EXPERIENCES

Chapter 1

ADVANCES IN CLEANER PRODUCTION IN THE UNITED STATES

Jeffrey J. Burke

ABSTRACT

In this chapter, a brief history is presented of the development of cleaner production programs and policies in the US. This will include activities at the federal, state and municipal government level, as well as actions by non-governmental organizations and academia. The term pollution prevention (P2) will be used interchangeably with cleaner production since that term is more commonly used in the US. Current trends are then discussed including the evolution of these programs, difficulties maintaining public support and prospects for the future. The chapter will focus on the following issues:

- Government initiatives to increase use of P2 strategies and technologies
- Purchasing initiatives
- Sector initiatives
- Program evaluation and measurement

This will only be a sample of the overall activities in each of these categories but will be representative of the successes that have been achieved in the US.

BACKGROUND OF CLEANER PRODUCTION IN THE UNITED STATES

Cleaner Production is used interchangeably with the term Pollution Prevention (also known as P2) in the United States. P2 had its beginnings in the US around 1985 following what has come to be known as the “Compliance Era” of 1970-1984. During this period much was accomplished in terms of cleaning up past practices: contaminated land, dirty air, and polluted waterways. This “Compliance Era” was focused on putting regulations in place and

complying with them, though industries eventually began to realize that environmental regulation came at a cost and was not a long-term answer. While command and control approaches such as wastewater treatment, air pollution control and improved design and operation of incinerators and landfills resulted in progress in reducing pollution, further progress through regulating more pollutants or tightening controls came at a much greater cost.

In the mid-1980s, companies began to see environmental issues as an opportunity to look at waste and inefficiency in their operations. An Era of Strategic Environmental Management with P2 as a major focus ensued from 1985 to 1994, with industry beginning to lead the way. It was during this time period when practically every state established technical assistance programs where businesses could turn to for help with managing wastes without concern of regulatory intervention except in cases of imminent endangerment.

3M's Pollution Prevention Pays (3P) program, which was initiated in 1975 by Dr. Joe Ling, began to be heard by industry. The 3P program promoted material substitution, equipment upgrades and changing methods as ways to reduce waste at the source. Dr. Ling proclaimed that pollution control technologies were not the single long-term answer and challenged 3M staff to look for ways to reduce waste. Other companies joined in, including Dow Chemical (WRAP) and the Xerox Corporation.

Other significant events that propelled P2 forward included the 1984 tragedy at Bhopal, India, and the discovery of another similar smaller leak in Institute, West Virginia, spurred passage of the Community Right-to-Know Act in 1986. This legislation put chemical releases in the public eye through the Toxic Release Inventory (TRI) reporting that allowed citizens, communities, and governments to become more aware of chemical releases in their areas and called for reduction of these chemicals.

At the government level, the first National RoundTable of State Waste Reduction Programs (beginning of the National Pollution Prevention RoundTable [NPPR]) was held in 1985 in Raleigh, NC, and state P2 programs began to spring up at universities and regulatory agencies. The United States Environmental Protection Agency (EPA) Administrator William Reilly called for "pollution prevention as a way of thinking and an approach to problem-solving" (The Next Environmental Policy: Preventing Pollution, U.S. EPA, 21Z-1021, Aug 1991). Also during 1985-1990, the EPA came out with several key reports including "Waste Minimization" and "Reducing Risk: Setting Priorities and Strategies for Environmental Protection" (U.S. EPA Science Advisory Board SAB-EC-90-021, 1990, Washington, D.C.) which promoted pollution prevention as the environmental protection strategy of choice. There was much enthusiasm when hundreds of representatives from over 30 nations met at the International Conference on Pollution Prevention: Clean Technologies and Clean Products that was held in Washington, DC in 1990. Finally, the Pollution Prevention Act was enacted by Congress and signed into law by President George H.W. Bush in 1990. However, unlike most of the previous environmental legislation in the US, the P2 Act does not require the creation of regulations, but rather establishes "source reduction" as the "remedy of first choice" when addressing environmental concerns. Funding for P2 activities was originally established at \$8 million, with the grantees matching dollar for dollar, and was significantly below the funding levels of other environmental legislation.

The various definitions of pollution prevention, cleaner production, eco-efficiency and waste minimization have made it difficult to add up the accomplishments of all the programs and initiatives both in government and by businesses. This is important because of the

patchwork of laws and programs that exist in the context of a regulatory and consulting system that addresses environmental issues by single media (air, wastewater and solid and hazardous wastes). There has been and remains great resistance to change to multimedia efforts by government and even the business community. USEPA is organized in media-specific divisions as are almost all of the states. Agency staffs are expert in the media-specific laws they implement but few have the mandate, expertise or comfort in dealing with issues in another media. Only the state of Massachusetts has organized its regulatory agency by industrial sector. Thus, most new “sustainability” innovations are being adopted outside of the US including the various voluntary International Organization of Standardization (ISO) programs, Europe’s Registration, Evaluation and Assessment of Chemicals (REACH) and others. In the US, these programs are being adopted by businesses that have divisions or market products internationally. In recent years, the states are taking the initiative to limit chemicals in certain products (especially electronics), to limit chemicals used in manufacturing, to recycle electronics, and designing products to be environmentally-friendly. But these initiatives are generally not promoted under the name of P2. New names, like product stewardship and social responsibility are being used to characterize these programs. One reason for this is P2 is commonly seen as being narrowly focused on the reduction of wastes at the source and not appropriate for these broader efforts.

The 1990s and beyond became known for continued development of newer environmental approaches and initiatives from industry and government alike. These sectors began to align their vision toward sustainability with P2 as a fundamental platform. EPA developed initiatives such as Design for the Environment (DfE) and product stewardship. The American Chemistry Council began their Responsible Care program, and P2 became part of ISO 14000 and ISO 9000. The CERES Principles (formerly the Valdez Principles) were developed by the Coalition for Environmental Responsible Economies, a non-profit organization based in the US which is comprised of investors and environmental groups, religious and public interest groups in the early 1990s as a ten-point code of corporate conduct to be publicly endorsed by companies as an environmental mission statement or ethic.

Since 1985, states and the federal government have worked to compile and share reliable information such as fact sheets, case studies, reports, manuals and other resources. These efforts have evolved into what is now called the Pollution Prevention Resource Exchange (P2Rx). This is a cooperative effort of eight P2 information centers from around the US and USEPA. This virtual collaborative organization houses over 50,000 documents relating to P2 and provides numerous services to the P2 community [www.p2rx.org].

The Government Performance and Results Act (GPRA) of 1993 increased the federal government’s emphasis on metrics. Under GPRA, all federal agencies must develop annual plans and reports and anyone receiving federal funds must measure the results of their efforts using these funds in accordance with the funding agencies strategic plans and metrics. In 2003, NPPR, using EPA funding, produced the Report “An Ounce of Pollution Prevention is Worth Over 167 Billion Pounds of Cure” documenting P2 results from 1990 to 2000. This report and two subsequent reports covering 2001 to 2003 and 2004 to 2006 estimate the following results:

- reduction of 200 billion pounds of pollutants
- conservation of 150 billion gallons of water