

A BIO-SYLLABUS: CLEANER PRODUCTION-THEORY, CONCEPTS AND PRACTICE

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Introduction

In the following pages, you will find an outline for the course, "Cleaner Production: Theory, Concepts and Practice", and a list of texts to be used as background readers. The topics, to be addressed in the different lecture periods, along with the suggested readings are also provided.

While Professor Huisingh will deliver most of the lectures and will coordinate most of the work sessions, several guest experts will also be invited to the course to share their experiences and insights about the Preventative Approach of "Cleaner Production". The primary texts for the course are:

1. Freeman, H.M., (1990) Hazardous waste minimization. Mc Graw Hill, Inc., New York, NY., U.S.A., pp. 343.
2. "Waste minimization", in Industry and Environment, pp. 68, Vol. 12, No. 1 January/February/March 1989, UNEP.
3. van Weenen, J.C., (1990) Waste prevention, theory and practice (a Ph.D. Thesis). J.C. Van Weenen, Castricum, The Netherlands, pp. 418.
4. Additional texts, from which readings will be selected, include, but are not limited to:
 5. Korhonen, M., (Ed.) (1989) Non-Waste Technology, Vol.I. Technical Research Centre of Finland, pp.457. Espoo, Finland.
 6. Korhonen, M., (Ed.) (1989) Non waste Technology, Vol.II. Technical Research Centre of Finland, pp. 372. Espoo, Finland.
 7. Huisingh, D., Martin, L., Hilger, H., Seldman, N., (1986) Proven Profits from Pollution Prevention: Case Studies in Resource Conservation and Waste Reduction. Institute for Local Self-Reliance, Washington, D.C., pp. 316.
 8. Huisingh, D., Bailey, V., (1982) Making Pollution Prevention Pay: Ecology with Economy as Policy. Donald Huisingh and Vicki Bailey, Pergamon Press, New York, NY. USA., pp. 156.
 9. Freeman H., et. al., (1987) Environmental High-Technology from Finland, pp. 186. Kirjapaino R. Lunkka Ky, Helsinki, Finland.
 10. Freeman, H., et. al., (1980) Waste Minimization Opportunity Assessment manual. The United States EPA, Hazardous Waste Engineering Research Laboratory, Office of Research and Development, Cincinnati, Ohio, U.S.A.

In addition, copies of individual articles will be provided during the course.

Course structure and format

The course will consist of lectures, discussions and small-group work sessions, simulations, case studies and readings. Professor Huisingh will lead most of the sessions, however, a number of guest lecturers will also make presentations.

Students, singly or in teams of two or three, will develop a "Term Project", based upon their selection of a topic of the course that is most relevant and interesting to them. Each student/student team, will, after consultation with Professor Huisingh, investigate the chosen topic and will prepare a written report of his/her/their findings. Additionally, near the end of the semester, each student/or student group will deliver an oral presentation of the results of their "Term Project" investigations. There will be a mid-term examination and a final examination. A few, unannounced, short quizzes, will also be given throughout the semester.

Course objectives

This interdisciplinary course, being offered for the first time during the fall semester of 1990, has as its goals:

- To acquaint the students with the fundamental differences between the theories, concepts and definitions of the new, "Cleaner Production," approach to environmental protection and those of the "Pollution Control approach", commonly practiced today.

- To explore, using concrete examples drawn from industries from around the world, how "Cleaner Production", is being implemented within companies in all branches of industry.
- To document the environmental and economic benefits of "Cleaner Production".
- To learn how many of the governmental policies and programs, currently in effect around the world, favor the "End-of-Pipe" Pollution Control approaches. To learn how new policies are being designed and implemented that foster and support, "Cleaner Production". Existing and model, governmental programs at the global, regional, national and local levels will be studied.
- To learn some of the management and leadership skills necessary for helping companies plan and implement policies and programs designed to actualize "Cleaner Production", within their firms.
- To explore the implications of "Cleaner Production", for the design and production of "Cleaner Products", and the provision of "Cleaner Services".
- To examine the roles of labor unions, environmentalist groups, consumer groups, the media, the financial institutions, the legal infrastructure, the insurance infrastructure and other societal sectors in helping and/or in hindering the transition to "Cleaner Production".
- To explore the functions and dynamics of corporate and product liability issues in stimulating interest in "Cleaner Production".
- To examine the importance and roles of corporate environmental ethics in the post-regulatory era of "Cleaner Production".

The course will address water quality, air quality and land quality problem/opportunity issues within the context of The Netherlands, Europe, the United States and the world. It will also address the relationship between improvements within the outer environment and the worker's and consumer's environments.

The overall goal of the course is to help the students understand the environmental and economic benefits from industrial and governmental implementation of the preventative approach throughout society. Students will be provided the opportunity to learn and to work with computerized and non-computerized methods of performing "Waste Reduction Audits" within companies. The course is divided into the following blocks:

Block I. Introduction to the concepts, theories and definitions of "Cleaner Production". This block will include information pertaining to the history of the development of environmental awareness and environmental regulatory approaches between 1950 and 1990. It will emphasize that, because most environmental policies were developed in reaction to actual or perceived crises in one medium or another, the regulatory mechanisms that were enacted, have a medium-by-medium, end-of-pipe, focus upon pollution controls. The need for the transition from these approaches to integrated "Cleaner Production" methods that focus upon "Pollution Prevention" will be explored. The political, industrial, environmental and economic benefits of this change in approach will be examined.

Block II. This block will explore the corporate dynamics of the implementation and operation of "Cleaner Production", within representative small, medium and large industrial firms, world-wide. The roles, within corporations, of "Mass and Energy Balances", "Waste Reduction Audits", "Internal Environmental Care Systems", "Product Quality Assurance Programs", and "Product Life-Cycle Planning Systems" will be studied.

Block III. Based upon the lessons learned within the first two blocks of the course, the question will be posed: "What changes in governmental and corporate policies and practices are effective in helping industrial firms within the "Developed", and "Developing" nations, formulate and implement "Cleaner Production" systems within their organizations?"

This section will address the necessity of the development and implementation of regulatory policies and procedures that increasingly promote integrated, multimedia approaches to "Pollution Prevention". It will also explore the types of changes in corporate management and employee involvement that are essential components of such "Cleaner Production" methodologies.

Students will learn that, some industries are developing new "Cleaner Production" methods that are integrating the following issues:

- A. Concern about the worker's environment
- B. Concern for the outer environment
- C. Concern for energy and material efficiency
- D. Concern for product quality
- E. Concern for the consumer
- F. Concern for societal sustainability

The students will then explore how Cleaner Production, can be implemented within companies by effectively integrating these main concerns within systematic and creatively flexible programs.

The roles of "Innovation Centers", "Technical Assistance Centers", "Environmental Information Networks", branch organizations,

research and educational organizations and NGO's in helping corporate leaders and governmental authorities implement "Cleaner Production" within their countries will be examined.

Block IV. Within this block "Cleaner Production" issues to be addressed will include, Eco-Labeling, Green Consumerism, Ethical Investments, Energy Efficiency, Product Safety, Product Durability and Product Life-Cycle Planning.

Block V. Within this block, the barriers and opportunities for "Cleaner Production" will be explored. The myths and realities of the political, social, economic, technical, environmental and informational factors that are alleged to be impeding the transition to "Cleaner Production" will be examined. Plans and programs to respond to these challenges will be developed by student teams.

The final, integrative section, will deal with the functions of "Corporate Environmental Ethics, in helping industries make the transition to "Cleaner production". It will also address citizen responsibilities in bringing about the society-wide changes that are essential for sustainable societies in our common future.

Course schedule

Date:Topic, Speaker and Reading(s)

Week 1, Lecture #1. Introduction to the course, including a brief review of the history of the development of awareness of environmental problems and of the regulatory and industrial responses to those problems. This will set the stage for the further discussion of the growing awareness of the need for the change from pollution control to pollution prevention approaches. The concept of "Cleaner Production", will be introduced as the better way for helping to ensure sustainable societies. Professor Huisingh will lead the discussion. Reading assignments, Text # 1, pages 3-14, & Text #2, pages 1-24.

Week 2, Lecture #2. Since concepts and definitions are often imprecise and confusing when new paradigms are being developed, this class period will be devoted to a review of the many and varied concepts and definitions pertaining to the preventative environmental protection approach. The concept of the "Systems View of Waste Prevention", will be introduced. Dr. J.C. van Weenen, of the Interfacultaire Vakgroep Milieukunde (IVAM) of the Univ. of Amsterdam, will address the class. Reading assignment, Text #3, pages 21-150.

Week 3, Lecture #3. What are the experiences of industrialists from small, medium or large companies, in the implementation of the "Cleaner Production" approaches? Illustrative industrial case studies from the U.S., Canada and Europe will be used to answer this question. Professor Huisingh will lead the discussion. Reading assignments, Text #1 pages 15-56 & pages 263-336, Text #2 pages 39-44.

Week 4. There will be further discussion of illustrative industrial examples and of the lessons derived from them. The eleven steps industrial leaders should take in implementing "Cleaner Production" within their companies will be presented. The U.S. EPA Waste Minimization Opportunity Assessment Manual will be studied as an example of a systematic tool for helping corporate leaders make the changes toward "Cleaner Production", within their companies. Professor Huisingh will lead the discussion. Reading Assignments, Text #1 pages 57-140, Text #3 pages 153-237.

Week 5. Workshop on Waste Minimization. Students, in working groups of 3 will begin to work through the Waste Minimization Manual, using data from a company from within the Project Industriële Successen Met Afvalpreventie, (PRISMA) as the experimental data. Professor Huisingh will lead the workshop. Reading Assignment, Text #3 pages 238-275.

Week 6. What corporate cultural changes are essential ingredients to help ensure implementation of "Cleaner Production", within industrial organizations? Drs. J.P.C. Dieleman of ESM will lead the discussion. Reading assignment, Text #1 pages 141-202, Text #2 pages 45-50.

Week 7. What roles should governments, at all levels, play in helping to effect the transition to "Cleaner Production?" While Professor Huisingh will lead the discussion, Dr. Sybren De Hop of the Nederlandse Organisatie voor technologisch Aspectenonderzoek (NOTA) of Den Haag will be guest speaker for this class period. Reading assignments, Text#1 pages 203-262, Text #2 pages 25-38, Text #3 pages 276-353.

Week 8. Mid-Term Examination

Week 9. What are the roles of "Quality Assurance Standards", "Eco-Labeling", "Green-Consumerism", "Ethical Investment Funds", and "Liability Insurance" in helping to move corporate policy and practice to "Cleaner Production?" Professor Huisingh will lead the discussion. In addition, a corporate representative of a major chemical corporation will tell of his corporation's experiences in making the transition to "Cleaner Production".

Week 10. What are the roles of environmentalist organizations in helping to make the transition to "Cleaner Production?" Professor Huisingh will lead the discussion and Ms Lisa Bunin of Green Peace International of Brussels, Belgium will be guest speaker.

Week 11. What is the technical feasibility of corporate changes to "Cleaner Production? Professor Huisingh lead the discussion and Mevr. Dr. Ir. M.P.C. Weijnen of the Delft Technical University, Center for Cleaner Technology, will be guest speaker.

Week 12. What roles will, "Corporate Environmental Ethics", "Political Environmental Ethics", and "Personal Environmental Ethics", play in helping countries become "Sustainable Societies?" Professor Huisingh will lead the discussion, students will work in small groups to evaluate illustrative ethical statements and to develop their own personal ethical statement. Reading Assignment, Text #3 pages 355-379.

Week 13. Student reports

Week 14. Student reports

Conclusion

During the last few years, it has become increasingly evident that unless humans change a number of their attitudes, practices, and technologies, the bio-support system of the earth will be so extensively disrupted that survivability and sustainability of humans upon this planet will be severely jeopardized. Much has been said about what should be done, but comparatively few experiments have been undertaken to move societal units to develop and to implement the necessary new concepts, values and practices essential for the transition to sustainable societies.

The author and some of his colleagues are engaged in a series of experiments in several countries that show promise of helping to effect some of the crucial non-technical and technical changes that must be made in societal interactions with the biosphere such as cleaner production, cleaner policies and cleaner values as integral to and essential for cleaner bios.

The author will also engaged in a world-wide study on educational initiatives that are currently underway or are being planned. Each is designed to help bring about the essential attitudinal, policy and practice changes that will help societies move into the 21st century in a more bios-supportive way than is currently occurring.

Professor **Donald Huisingh** is currently Professor of Environmental Sciences at Erasmus University in Rotterdam. He has led and directed interdisciplinary research teams and fact-finding task forces in his effort to implement preventative approaches to environmental quality improvement. Dedicated to the development of integrated approaches for the solution of societal problems, Professor Huisingh has collaborated with industrialists, political leaders, academicians and students alike in coordinating educational and research mechanisms capable of accomplishing such holistic, system-wide approaches. A recipient of numerous grants and awards, he is the author of more than 90 publications, most recently on hazardous waste reduction and pollution prevention. Professor Huisingh is currently also assisting the United Nations Environmental Office in the Development of a Global Information Network on Concepts, Policies and Technologies on Low and Non-Waste Technologies.