

COLLABORATION BETWEEN INDUSTRY, UNIVERSITY AND GOVERNMENT AS A KEY STRATEGY IN ACHIEVING CLEANER PRODUCTION : CASE STUDY OF MAURITIUS

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The societal shift to Cleaner Production (CP) requires the active involvement of government, industry and research and educational institutions. CP cannot be achieved by one group alone - partnership between these three groups not always used to working together is required. Partnership enables a greater mobilization of skills and resources, allows problems to be addressed in a more integrated way and avoids unnecessary duplication of effort and cost. It also help traditional adversaries to broaden their perspectives, facilitates the flow of information and improve mutual understanding. A strong partnership between government, industry and the scientific community is the foundation on which CP will need to be built.

Table 1 summarizes the more relevant problems regarding these three actors that play an important role in CP promotion. Government has a strategic role to play in, providing the necessary framework and stimulating industry demand for CP. Appropriate legislation, effective enforcement, economic incentives, voluntary agreements, demonstration projects and information and promotion programmes provide a variety of policy instruments which government can implement. Education and training activities are crucial for the promotion of CP and different strategies can be used to integrate this concept in university curricula; from single lectures in existing environmental course modules to development of new post-graduate programmes. Students and university staff can gain practical experience by assisting industry in CP activities. Training should produce innovators and to make this link involves integrating personnel from both the company and research institutions into relevant R & D activities. During the synthesis phase of an environmental auditing exercise, the ideas for CP options may come from literature search, from personal knowledge, from example in other companies, from specialised data bases or from some further R & D. A creative intellectual environment based on the widest possible experience is thus needed in order to think of all possibilities.

Demonstration projects are an important vehicle for education and training involving participation at all levels within a company and of academics from research and educational institutions. The attraction for industry for a better university/industry interaction is that it benefits from a relatively unbiased advice and a cheap research facility with no ongoing personnel costs.

Table 1 : Problems of University, Industry and Government in the promotion of Cleaner Production (CP)

Industry	Government	University/Research Institutions
<p>Lack of a “Waste Management Culture”, leading to the mix of wastes at the source</p> <p>Lack of trust in government authorities and ignorance of existing environmental regulations</p> <p>Lack of support by industry managers for the implementation of environmental management policies because the cost of pollution control has not been included in their production costs</p> <p>Great differences in the capacity to deal with pollution prevention and control between large industries and SME’s</p> <p>Poor environmental awareness among workers and managers</p> <p>Consultant firms use a “technology colonization” approach based on the import of foreign technologies</p>	<p>Lack of clear and continuous policies to support CP</p> <p>Incomplete regulatory framework and uneven enforcement</p> <p>Inappropriate standards - copied from industrialized countries</p> <p>Inefficient coordination among different agencies at different levels</p> <p>Lack of economic incentives by government to foster technological change</p> <p>Inadequate mechanisms of communication with the industrial sector</p> <p>Government-state owned industries have generally a poor environmental performance</p> <p>Lack of trust in industries</p> <p>Lack of human resources and infrastructure to support CP programmes and to enforce regulations</p> <p>Lack of an education policy concerning environmental education throughout the educational programmes</p>	<p>Slowly updated and rigid educational technological programmes that do not reflect the actual needs of the industries and countries in the region</p> <p>Poor mechanisms to facilitate the establishment of links with industries to support technology innovation</p> <p>Lack of a “language” to communicate with both industry and government</p> <p>Slow response to the demands of the industries and in the delivery of results of their studies and projects</p> <p>Promotion criteria and research funding are less based on the practical applicability of the research and in the bridging efforts between disciplines and between university and society</p>

While it is industry that ultimately must implement CP, the role of government and university is to provide an environment that will accelerate the process and encourage industry to initiate its own CP programme. Attention should be directed at the following three issues:

- (a) providing information about the technology involved and the environmental tools industry needs to make CP assessment of its activities and products.
- (b) organizing training on CP specially for SMEs
- (c) helping to change educational curricula, in order to integrate the environmental dimension in all engineering and business management courses. CP promotion requires the reinforcement of CP curriculum in university engineering education. Most curricula at the university level include the study of environmental engineering topics as part of the civil engineering course. However, the principal developers and deployers of CP technology in industry are chemical and mechanical engineers and these people should therefore be well prepared for this task through university programs that include CP curriculums.

In its present state of development when Mauritius is poised to diversify its economy and stands at the threshold of the phase of rapid industrialisation, one of the challenges it faces is that of introducing the CP concept in industry. This paper presents the types of collaboration which have been initiated between industry, university and the authorities. There are growing signs of interest in research in private firms. But the major thrust for the future lies in a more productive role for the government in inspiring new R & D initiatives and endeavours. The government has recently set up a research council whose primary objective is to foster and coordinate R & D policies on a national basis. Environment-related projects account for nearly 35% of the council's R & D funding and 75% of its funding goes to the university. The teaching company scheme has been initiated, in which the university and a company participate jointly in an industrial project funded partly by the research council. This scheme operates mostly at the postgraduate level and the research council mainly gives a research grant to the student while other expenses are met by the industry and the university.

Training workshops on CP are run by the university in collaboration with private sector organizations. Modules which have been developed use interactive teaching methodologies such as case studies, simulation exercises, problem solving and group exercises. This educational approach is based on the understanding that people learn more fully by doing than by listening passively.

A short term goal in the promotion of CP is to set up one effective cleaner production demonstration project that will launch a snowball effect throughout the industrial sector, and which will eventually spread to other industries. Two such demonstration projects, funded by the industries and the authorities have been set up in a cane-sugar factory and a textile dyeing factory by academic staff. These demonstration projects are useful in revealing obstacles to progress both within the companies and in the relationship of companies to the outside world. The aim of such demonstration projects is also to enhance the institutional and research capacities for cleaner production within industry, government and academia.