

Stepping upstream ‘naturally’ for cleaner production through community environmental learning

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Abstract

A closer partnership with the general community is one way that industry can gain support for moving towards cleaner production and effectively address the decline in the global environment. The Earth’s Choice Renewable Energy Programme of Energex in Queensland, Australia, is one example of this form of cooperative alliance. More extensive community cooperation with industry requires greater community understanding of environmental decline and the requirements for sustainable living. For this to occur, community ‘learning’ about sustainability must be presented in an easy to understand manner. A systems approach to cleaner production, in conjunction with the emerging systems of The Natural Step approach to ecological sustainability and Appreciative Inquiry, is introduced as the basis for a simple, clear, and easy to understand community education program. Stepping ‘upstream’ to education at the grassroots community level, away from a pure focus on industry, will promote a community/industry union that can contribute to both cleaner production and global competitiveness. © 2000 Elsevier Science Ltd. All rights reserved.

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1. Introduction

Like so many terms in the ever evolving environmental field, the phrase ‘cleaner production’, which was coined by the United Nations Environment Programme (UNEP) when it launched the Industry and Environment Programme Activity Centre’s Cleaner Production Programme in 1989 [1], has many definitions. To add to the confusion, the terms ‘cleaner production’, ‘pollution prevention’, ‘clean technology’, ‘low cost technologies’, waste minimisation, and so on, are often used interchangeably [1–3]. One recent definition set forth by UNEP suggests that cleaner production is the “continuous application of an integrated preventive environmental strategy to processes and products to reduce risk to humans and the environment” [4]. Alternatively, in defining cleaner production, Environment Australia uses terms such as ‘preventing pollution’, ‘minimising waste’, and ‘production processes to achieve sustainable production’ [5], while a more succinct but dated definition from the United States Environmental Protection Agency characterizes cleaner production as the

“maximum feasible reduction of all wastes generated at production sites” [6].

All of the above definitions tend to have linear, problem- and solution-oriented overtones, with an industry focus. The purpose of this paper is to highlight the proposition that cleaner production is not just an *industry* ‘problem’, but an issue for the entire community. As such, this paper suggests that industry adopt a non-linear, systems approach to cleaner production and move beyond industry boundaries to form creative partnerships with the general community. Discussion then ensues on how community learning, through The Natural Step and Appreciative Inquiry approaches, can facilitate this partnership and help promote innovative and competitive cleaner production practices.

2. A systems approach to cleaner production

The accepted strategy for addressing pollution concerns has progressed from ignoring the problem, to dilution, end-of-pipe controls, and on to what is generally the essence of cleaner production, ‘upstream’ management—i.e. attacking the pollution at the source of production [7]. Upstream management generally

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includes activities such as efficient operating procedures, material substitution, technology changes, on-site recycling, and product redesign [3]. Nevertheless, despite the complexity associated with cleaner production issues, upstream management solutions still tend to be of a linear, problem- and solution-oriented nature. As such, we may need to consider a more complex approach to cleaner production if we are to close the ever widening gap between what is being done and what needs to be done to arrest environmental decline [8]. We need to travel *further* ‘upstream’ than just the source of production, and yet at the same time keep the increasing complexities as simple as possible.

These days, the problem of keeping complex issues simple burdens many disciplines. As we move into the new millennium, there has been a significant resurgence of the concept of systems thinking. Although examples of forms of systems thinking date back to Aristotle (c. 350 BCE), it was primarily in the first half of the twentieth century, through the work of scholars such as Bertalanffy, Wiener, Ashby, and more recently Forrester, Beer, Checkland, and Simon, that the Western World developed modern systems thinking and associated concepts [9–11]. As the name implies, ‘systems thinking’ is a way of simplifying *thinking*, about natural as well as complex conceptual issues, in a holistic, non-linear, non-reductionist manner. Peter Senge [16] refers to systems thinking as ‘the fifth discipline’ and describes it as “a discipline for seeing wholes; ...seeing interrelationships rather than linear cause–effect chains, and seeing processes of change rather than snapshots” (pp. 68 and 73). ‘Associated concepts’ include: goal-oriented, hard systems thinking; soft systems thinking, which is more interpretative and tends to focus on learning and organising multi-relational ‘problems’; critical systems thinking; cybernetics, or self-regulating systems; and complexity theory [12–15].

It is beyond the scope of this paper to give any more than a brief overview of systems thinking. It suffices to say that thinking in systems, the observer will identify an entity or concept as a whole and independent system that has inputs, outputs, and a boundary. An example is thinking of cleaner production as a holistic system which contains all the characteristics and components linked to the concept of cleaner production within its boundaries. From this foundational system, which we are calling the cleaner production system, other related, interdependent, lower order systems, or sub-systems, will emerge, or be identified. In turn, sub-sub systems will emerge from the sub-systems, and so on. These emerging lower order systems are known as emergent properties. In the case of cleaner production, some of the many emergent properties—or sub-systems—might be identified as: production redesign, material substitution, customer requirements, and even the general community. Further, all of these

sub-systems will have their own lower order systems or emergent properties.

It should be remembered that while cleaner production is the foundation system of what we are calling the ‘system of cleaner production’, it too is merely a sub-system of one or more larger systems—for example, that of environmental management, which has many emergent properties other than cleaner production. Moreover, environmental management is but a sub-system of any one of a number of larger systems again, such as sustainable development (see Fig. 1).

This hierarchical range of sub-systems allows the researcher to focus on the issues associated with each of the *independent* systems, while acknowledging the *interdependence*, and impact, that each of the sub-systems will have on each other. The result is that complex issues, like sustainable development, retain their holistic integrity, and yet the component parts (sub-systems) such as cleaner production can also be examined holistically without undergoing scientific reductionism. In other words, systems and their properties are not understood by reduction analysis, but by their interdependent, contextual relationships [17].

As Hillary [20] contends, it is new attitudes, not new technologies, that are required to move toward cleaner production. A systems approach allows us to explore as many ‘new attitudes’ as our inventive minds can create. As illustrated in Fig. 1, a systems approach to cleaner production will certainly include as sub-systems innovative ideas at the source of production, such as material substitution, but also even more creative approaches to cleaner production, such as ‘ecodesign’.¹ Yet, currently, the focus of cleaner production, all too often, revolves exclusively around the factory, or organisation, or source of production, and so on. While acknowledging that cleaner production is primarily about the reduction of pollution, it also needs to be acknowledged that pollution is not only an industry problem, it is a problem that impacts on the entire community, as alluded to in the UNEP definition of cleaner production [4]. Therefore, those organisations working towards cleaner production might benefit by asking the community to work in partnership with them to help support their endeavours. Thus the community becomes an emergent property—in other words a sub-system—of cleaner production, as illustrated below.

3. Community/industry partnerships

The dynamic nature of environmentalism has led to an increasing volume of literature about industry partner-

¹ Ecodesign involves designing products to be manufactured and used in the most ecologically sustainable manner, by incorporating concepts like replacing the *sale* of a product with the *use* or the *lease* of the product [18,19], depending on the customer’s requirements.

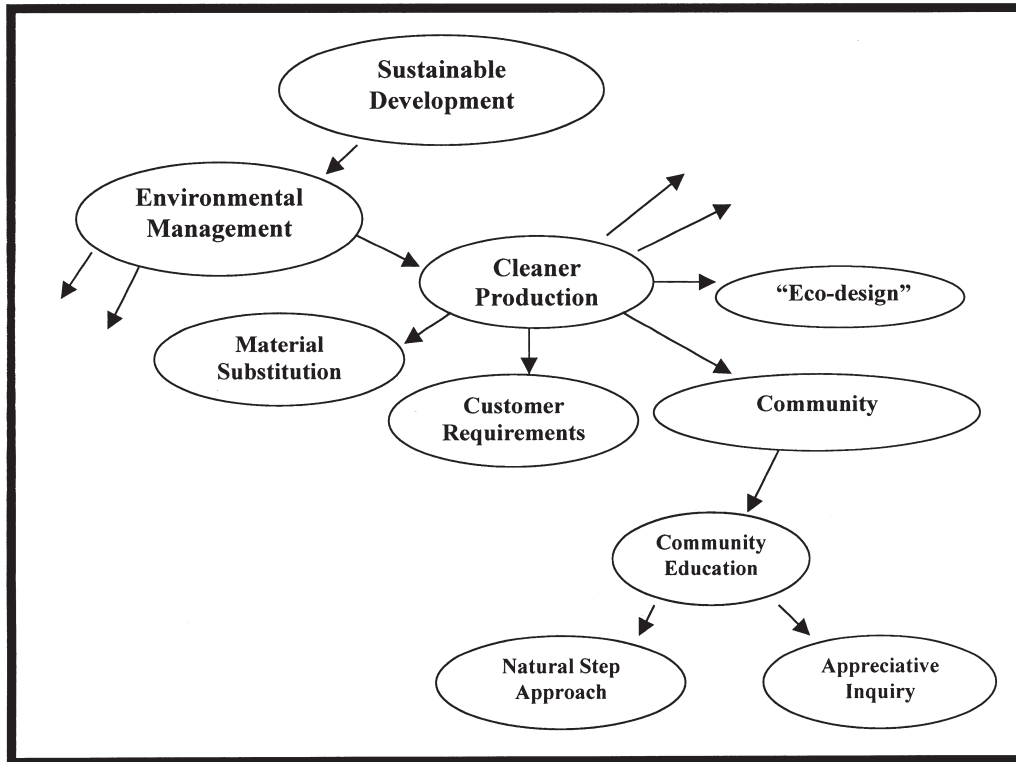


Fig. 1. Cleaner production system with emergent sub-systems.

ships. Sometimes these are partnerships mainly within an organisation, as with 3M's Pollution Prevention Pays programme. Alternatively, some are government/industry partnerships, such as the New South Wales (Australia) government's Sustainable Energy Development Authority [21] and its 'Energy Smart Business' programme. Partnerships are even emerging between environmental lobby groups and industry: for example, Email's collaboration with Greenpeace to produce 'ozone and greenhouse-friendly refrigerators' [22]. Recently, alliances directly between industry and the general community have appeared. One example is the Earth's Choice Renewable Energy Programme run by the electricity supplier Energex in Queensland, which encourages customers to use renewable energy. The Waste Reduction Accreditation Programme (WRAP), initiated by Clean Up Australia in conjunction with the Coles supermarket chain, is another joint industry/customer project. WRAP's aim is to get customer/community support to help reduce waste coming out of facilities such as supermarkets, with a significant focus on the reduction of unnecessary packaging.

There is plenty of evidence indicating that the community will rally to an environmental cause if invited by industry to do so [23,24]. However, the extent to which a community will engage in such alliances will normally depend on the extent to which it *understands* the problem of sustainable development, or more specifically in this case, cleaner production.

4. Upstream to community 'learning' for sustainable development

It is becoming well recognised that the greater the extent of environmental understanding, the more successful the community/industry partnership will be. As the President of George Washington University put it, "Most of us do not lack a philosophical commitment for sustainability, *we lack the knowledge necessary to make decisions for sustainable actions*" (emphasis added) [25]. Similar comments highlighting the importance of education can be seen time and time again [26–30]. In more recent times, recognising the need for knowledge and information, Education for Sustainable Development, in its many formal and non-formal modes, has been a major issue for governments and public sector agencies around the world. To illustrate, in the United States, one of the three missions of President Clinton's President's Council on Sustainable Development, is to 'expand public awareness' [25]. A Public Linkage, Dialogue, and Education Task Force was subsequently set up to ensure that that mission would come to fruition. And in Australia, Environment Australia has just released a discussion paper, *Today Shapes Tomorrow: Environmental Education for a Sustainable Future*, which is aimed at "placing environmental education unambiguously on the list of essential national endeavours towards sustainability" [26].

As illustrated in Fig. 1, when the cleaner production

industry joins with the community, the community then becomes a self-contained system from which *community (sustainability) education* becomes an emergent property. And because emergent properties associated with systems hierarchy do not stop at the second or third level but rather continue all the way down, an emergent property of community education needs to be a *systems approach to learning about sustainability and cleaner production*. Two appropriate systems that might be considered for community learning and the change practices needed for sustainability are The Natural Step approach (for the content) and a form of Appreciative Inquiry (a process for delivering that content).

The Natural Step approach is a very simple and succinct diagnostic, strategic planning, and pedagogical tool that was developed in Sweden about 10 years ago and is currently being adopted by an ever-increasing number of organisations world-wide. It is based on four simple principles, which are in essence:²

1. reduce what is removed from beneath the Earth's crust,
2. reduce the waste that is created by society and left to accumulate on the Earth's surface,
3. reduce the depletion of biodiversity and the resources above the ground, and
4. strive for social equity.

The Appreciative Inquiry system of generative intervention is ideally suited to facilitation of the exploration and understanding of these principles. One of the originators of Appreciative Inquiry, David Cooperrider, describes Appreciative Inquiry as a philosophy, a methodology, and also an intervention theory (see Ref. 31, p. 6). It is a "search for knowledge and a theory of intentional collective action..." (Ref. 32, p. 159) and stems from four main sources: social constructionism, action research, the appreciative values systems theory of Sir Geoffrey Vickers, and positive mental imagery. Appreciative Inquiry is based on a number of key assumptions [31–34], the most relevant of which state that:

1. A significant level of 'good practice' is already going on somewhere in the community and within organisations.
2. People feel more comfortable and have more confidence in embarking on a journey of change when they can carry with them familiar aspects of the past.
3. Therefore, change is greater when the most positive and beneficial 'good practices' that already exist are carried forward on the journey of change.

4. The questions we ask ourselves and others will influence our community and the change process in a significant way.
5. The language we use will create a reality that is shared.
6. It is important to value differences because it is from differences that true innovation occurs.
7. The process of creatively envisioning a desired future will be enhanced if we consult broadly, learn from our past, and have the courage to step outside the boundaries when imagining possible alternative actions.

An example of an approach to community education for sustainability which integrates the content of The Natural Step approach with the facilitation process of Appreciative Inquiry can be seen in a workshop developed by the Global Institute for Learning and Development (GILD) (formerly the Institute of Workplace Training and Development), an organization based in Brisbane, Australia. An overview of the framework that guides a 90-minute workshop, which forms part of GILD's Sustainability Learning Package, is presented in Fig. 2. While the guidelines in Fig. 2 refer to an umbrella workshop on Sustainable Development per se, the flexibility of the basic process allows for the facilitation of workshops with a more specific focus on any Sustainable Development sub-system, such as cleaner production. Consequently, this approach could be utilised by the cleaner production industry to develop partnerships with, and enhance information, attitudes, and sustainability and cleaner production practices within, a wide cross-section of the community.

5. Conclusion

Cleaner Production has come a long way from end-of-pipe 'solutions' to upstream management activities. However, if we are to arrest the continuing environmental decline, we need to travel even further upstream. The concept of Cleaner Production needs to move outside the boundaries of the industry itself, into an industry partnership with the community. To that end, the increasing complexities of the industry, and for that matter the entire concept of sustainable development, must be kept as simple and easy to understand as possible. This paper offers a systems approach to cleaner production as a way to simplify the field holistically, without scientific reductionism. With this community/industry partnership, community education would need to emerge as a sub-system of cleaner production. It is suggested that the systems of The Natural Step approach and Appreciative Inquiry emerge from the community education system to facilitate knowledge, understanding, innovation,

² The exact wording of each of the four principles is more detailed and contains a number of significant nuances. The four principles are presented and explained in full at <http://www.naturalstep.org>.

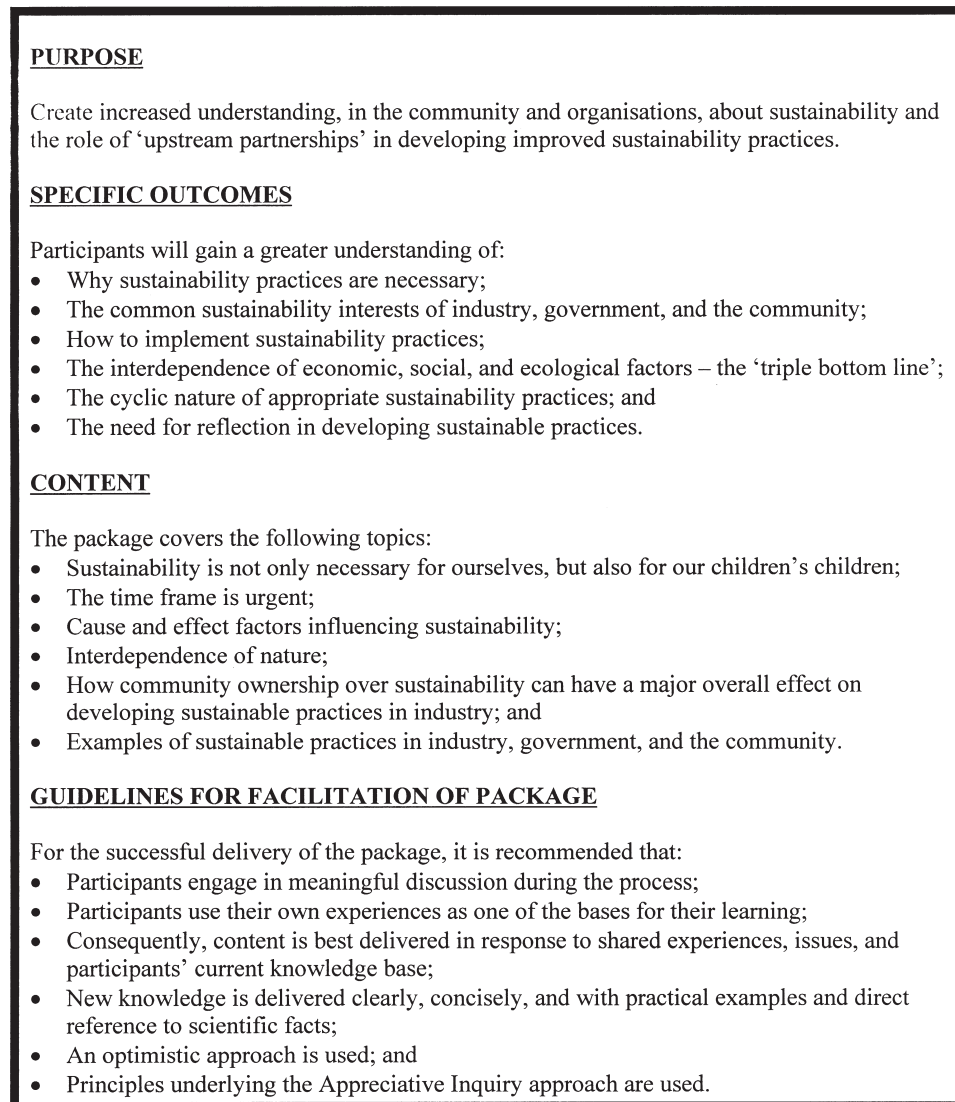


Fig. 2. Overview of 90 minute sustainability learning package.

action, and change. This, in turn, will promote creative and more competitive cleaner production practices.

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