A DECISION SUPPORT SYSTEM FOR CONFLICT ANALYSIS ON ENVIRONMENTAL EFFECTS OF ENERGY CONVERSION

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Abstract

Environmental aspects play an important role in the complex decision process of energy production.

In this article we describe an Environmental Assessment System (EASY) that functions as a decision support system to actors or groups of actors involved in the decision process.

The system contains two dimensions: one for information processing and one for evaluation. The information processing dimension deals with the representation of real world phenomena by means of impact analysis (cause-effect chains). The evaluation dimension deals with evaluation of a set of alternatives at each level of the cause and effect chain. The potentials for use of EASY in situations of conflict between (groups of) decision makers are discussed by means of two examples.

I. Introduction

The use of decision support methods, such as multi-criteria analysis and multi-objective analysis, for decision making on environmental issues has increased dramatically over the last two decades. A general trend exists to move from prescriptive, 'black-box,' one-step methods to interactive, open, iterative methods. The latter methods promise to be especially useful for environmental issues where various interest groups have conflicting objectives and priorities. In this contribution we describe a decision support system, the Environmental Assessment System (EASY), which functions as both a learning, communication and decision making environment for one or, preferably, more decision makers.

In section 2 we start with traditional cost-benefit and multi-criteria approaches, and discuss the outlines and objectives of decision support systems.
for multi-criteria decision making in situations of environmental conflict. Section 3 constitutes the main part of this contribution. The Environmental Assessment System is presented, and illustrated by a first application. Within the system two dimensions of operations are distinguished: one for information processing and one for evaluation of alternatives. The dimension of information processing deals with the representation of real world phenomena by means of impact analysis (cause-effect chains). The evaluation dimension deals with the possibilities of performing evaluation of alternatives at each element of a cause-effect chain. The system is demonstrated in the selection of an alternative for power generation that is environmentally 'most sound.' In this application other aspects of power generation (e.g., economic and technical aspects of meeting the demand for electricity) are not included. The potentials for use of EASY in situations of conflicts between (groups of) decision makers on the selection of alternative ways for power generation are discussed in section 4, by means of two illustrative examples. In section 5 some tentative conclusions and perspectives for further work are presented.

II. Evaluation Methods and Conflict Analysis for Environmental Issues

In policy analysis on most, if not all, environmental issues a wide range of goals and objectives are to be taken into account. Conflicts exist between:

a) interest groups and other parties involved, whose interests may be formulated in terms of
b) objectives, in general terms, e.g., economic development, employment, environmental quality, sustainability,
c) attributes of objectives, e.g., for environmental quality: acidification, radiation, noise, safety risks,
d) interests of present and future generations,
e) regions, on the geographical distribution of results for the objectives.

In particular, the presence of various interest groups (e.g., environmentalists, industry, political parties, policy makers) render traditional methods of multi-criteria analysis—including cost-benefit analysis—less useful. Conflicts between interest groups extend beyond the different weights they attach to objectives, and beyond the issue of decision making procedures: generally, there are conflicts on mere definitions, technical and economic data, hypotheses, theories and models that explain the effects of policy alternatives on the various objectives. This calls for additional communication-, mediation- and negotiation procedures.

Available decision support for complex environmental issues may generally be grouped into categories such as cost-benefit analysis, multi-criteria analysis or multi-objective analysis.

Cost-benefit analysis (CBA), as an evaluation method, is suitable for situations with conflicts between interest groups, because it aims at assessing costs and benefits at a group level (e.g., society, a city, a corporation). The interests of all parties involved are then included in the analysis. The method explicitly deals with conflicts b to e above, in assigning monetary values to objectives (if reasonably possible). Future costs and benefits are discounted into one 'present value.'

The method of CBA can be characterized as a 'one-step' method for identifying optimal group decisions. Without proceeding to a detailed discussion