

Chemical Engineering Seminars – HT 2008

***Week 3: Tuesday 12 February, 4:15 - 5:15 pm
Lecture Room 2, Thom Building, Engineering Science***

The use of multiple criteria decision analysis to support technology selection for power generation

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Abstract

The call for the use of cleaner production processes requires, among other, the consideration of environmental aspects alongside more traditional technical and financial aspects during decision making pertaining to technology selection and design. This seminar will present an approach based on multiple criteria decision analysis (MCDA) which allows the commensurate consideration of all aspects of relevance to the decision situation (e.g. financial, technical, environmental and social aspects), the explicit exploration of the trade-offs amongst these and the selection of alternatives that are consistent with the values and preferences of those involved in the decision process. In addition, the paper presents an integrated approach to the consideration of the implications for decision making of both technical uncertainties (i.e. those pertaining to the potential consequences of the alternatives) and valuation uncertainties (i.e. those introduced during the evaluation of these consequences). Key elements of this approach include a “distinguishability analysis” step to determine whether the uncertainty in the performance information is likely to make it impossible to distinguish between the alternatives under consideration, and the use of a multivariate statistical analysis approach, called principal components analysis (PCA), which facilitates the rapid analysis of large numbers of parallel sets of results, and enables the identification of choices that lead to similar and/or opposite evaluations of the alternatives. The approach to decision support is illustrated by means of case studies based on technology choice decisions faced by a large electricity provider in a developing country. Using the concept of “decision spaces”, it is possible to show the relationship between these power generation decision contexts and decision making associated with (chemical) process design.

Bio-sketch

Lauren Basson is a Lecturer at the Centre for Environmental Strategy (CES) at the University of Surrey where she is the director of the postgraduate teaching programme on Life Cycle Management. She holds a PhD degree in Chemical Engineering from the University of Sydney in Australia (awarded in 2004). Her principal research interests are within the field of Industrial Ecology with a particular focus on decision support for complex decision situations. Prior to commencing with the PhD, Lauren worked as an Environmental Process Engineer in an environmental consulting firm in Johannesburg, South Africa, where she consulted principally to the mining and minerals processing industries. She has also consulted extensively to the South African electrical utility (Eskom) on a range of projects including the screening of greenhouse gas reduction projects for the Clean Development Mechanism of the Kyoto Protocol and the incorporation of sustainability considerations into the performance evaluation of senior management.