

Practical Applications for the “Ecosolvent” Model

David H. Bayne
Group Energy Manager
Ciba Specialty Chemicals Inc.
4002 Basel
david_h.bayne@cibasc.com

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Summary: The decision on disposal or recycling of used solvents in the chemical and pharmaceutical industries is often based on perceived lowest cost routes, on utilisation of existing assets or on the logistics of transporting these flammable substances. As signatories to “Responsible Care” and in the framework of sustainable production, companies like Ciba must also take the environmental impact of such activities into full account, both in the development of new processes and as a challenge to established practices. Recent and emerging EU legislation in the field of pollution control and waste management take this further, and as a condition of granting an operating permit for chemical production, require proof that “best available techniques” (BAT) are implemented. The “*Ecosolvent*” model promises to be a valuable tool in ensuring that the life cycle impact of solvent use is taken fully into consideration by manufacturing companies and in providing evidence that BAT has been implemented.

Regenerate or Incinerate? An informal survey prompted by the dissertation project of Mr. Capello indicated that the routes currently used for regeneration, recycling or disposal of solvents used in chemical processing or generated as by-products had (a) often not been reviewed regularly (b) were based on existing assets for regeneration or incineration, (c) were determined by the logistics of moving large volumes of solvent (d) were subject to long-term contracts with third parties whose practices were not fully transparent or understood and (e) if reviewed, were evaluated purely on economic criteria. For companies aiming for sustainable production, this is a situation capable of significant improvement, and although the criteria for evaluating the environmental impact of solvent manufacture and use are known, the analysis of each application would require extensive analysis by environmental specialists. The *Ecosolvent* model provides a tool which can be used by chemists and chemical engineers who are not environmental experts, not only to design new processes and installations around the most sustainable solvent systems which are also economically viable but also to rapidly review all existing routes for the recycling and/or fuel utilisation of solvents, including those which are bound up in contracts for external regeneration or incineration.

Emerging EU Legislation. The implementation of IPPC (Integrated Pollution Prevention and Control) by the EU member states requires manufacturers to demonstrate that BAT (Best Available Practice) has been implemented in manufacturing activities which generate waste or pollute the environment. IPPC is in fact a permit to operate and covers aspects such as use of low-waste technology, less hazardous substances, emissions, consumption of raw materials, waste regeneration and efficient use of energy. While IPPC permits concern individual installations, global consideration of emissions from, and use of resources by upstream activities will determine BAT for various manufacturing sectors.

The *Ecosolvent* Model promises to provide a valuable tool for selecting and demonstrating BAT to the relevant authorities and interest was expressed in “*Ecosolvent*” by representatives of the UK “Envirowise” program at a recent seminar on the EU incineration directive.

Local Solution or Life Cycle Optimum ? Legislation tends to confine the measurement of environmental effects to defined sites, either because of delegation of enforcement to a local authority e.g. VOC balances in Switzerland, due to over-emphasis on local effects such as noise, traffic or emissions, or due to rigid permit rules. In the analysis of the environmental (and economic) impact of use of materials such as solvents, it is necessary to examine the global impact of the material during its whole life cycle. The *Ecosolvent* Model does this by applying established methodologies such as Cumulative Energy Demand and Eco-Indicator 99 to the life cycle of solvents, from manufacture through regeneration or recycling to incineration or disposal in waste water treatment. Experience has shown that insistence by local authorities on local solutions which are environmentally unsound (“not in our back yard”) or bureaucratic can be overcome if the global sustainable optimum can be demonstrated and given a value. The *Ecosolvent* model is ideally suited for providing such data which can be used for appeal to higher authority in such cases.