

## SYMPOSIUM:

## ENGINEERING AND ECOLOGY

## OPENING ADDRESS:

## ENGINEERING AND ECOLOGY—WHAT IS AT ISSUE?

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## ABSTRACT

Emotion rather than studied reason seems to pervade virtually all discussions of environmental problems these days. "Pollution" has become a loaded word implicitly condemning what it describes. The anti-pollution lobby is vociferous and its condemnation of industry may be dangerously indiscriminate; pollution is an economic not a moral issue.

Environmental problems have three reasonably discreet origins.

1. Conscious acts which may affect æsthetic appeal but which do no physical damage to the environment.
2. Conscious acts which may result in damage or pollution.
3. Pure accidents which may have deleterious effects.

The first category includes, for example, the building of airports, roads and electricity pylons. These generate much criticism, but are we prepared to do without the benefits they bring?

Examples of the second category are legion and it is important to ascertain all the facts and assume the right priorities when attempting to correct any particular situation. For example, in air pollution, emphasis has shifted from soot, dust and pollen to carbon monoxide and sulphur dioxide and the Los Angeles smog drew attention to nitrogen oxides and photo-oxidants; but these agents account for only a small number of pollutants which may, perhaps, not even be the most

dangerous. Asbestos particles from vehicle brake-linings and insulation material may be a health hazard and 70 percent of particulate contaminants in urban air are yet to be identified. In view of this ignorance, controlling emission of soot, carbon monoxide or sulphur dioxide would only go part of the way toward controlling air pollution. Any control measure is useful but a rational policy would not be possible until a systematic chemical survey of air contaminants has been made and their effects on people and ecological systems determined.

A similar lack of knowledge surrounds the problems of water pollution and disposal of solid wastes.

The third set of problems—accidents—is extremely difficult to prevent without setting regulations so stringent as to completely stifle innovation. Every reasonable step must be taken to prevent accidents such as the Torrey Canyon disaster and the Santa Barbara oil spill for example, but the acceptance of an element of risk is the price we pay for admittance to the twentieth century.

Solutions to environmental problems may be sought through comparisons of costs and benefits once all the facts are obtained and the priorities considered. The alternative is judgment on some absolute moral ground; but no country can afford to ban pollution on principle. Chlorinated hydrocarbons are a case in point. The western world can afford to ban these potentially dangerous chemicals but poorer countries cannot accept the cost which to them is measured in terms of starvation due to crop failure and death due to diseases such as malaria.

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However, problems of pollution and the environment are secondary to, and stem from, those of population. If mankind insists on reserving the unalienable right to continue its unchecked breeding then there is little hope whatsoever for the future. And even if something can be done about the population problem living standards must be maintained. These depend ultimately on our ability to harness energy for our own use.

The problems of using fossil fuels for this purpose are well known to ecologists and, in the long-term, atomic energy is likely to be the only alternative. Employed directly as heat energy this would mean electrification of the whole economy—a prohibitively expensive conversion and impractical for such things as air transportation.

An energy supply based on hydrogen may be more practical. This would be a closed system and would not pollute the biosphere. The advantages are obvious but the question of “how” remains. With present technology nuclear energy could be converted to hydrogen through heat, electricity and electrolysis of water at a thermal efficiency of only 32 percent.

With peak producibility of at least some fossil fuels being likely to be reached before the year

2030 (or at about the time when buildup of carbon dioxide concentrations in the atmosphere may prevent their use anyhow) the problem of an alternative energy supply is urgent. The hydrogen economy offers a solution but a great deal of research is needed and our technology must make it economic.

I am convinced that there exists no pollution problem which cannot be solved. Technologists have got us into the position we are in today because of the almost exponential growth of the human population. They simply have not had the time to “sweep the dust under the carpet let alone get out the vacuum cleaner”. I am convinced, however, that technologists can solve our present problems.

Let us not imagine that what is needed is less technology. This route will only lead us back into the Dark Ages. What is needed is more technology and all technologists need is a little less hectoring and a little more help, particularly in assessing priorities.

Time is not necessarily on our side.

Editor.