

cost-benefit analysis is as applicable to small projects (insulating a house) as it is to large projects (building a methanol plant).

Since individuals and firms do not need to consider external or social costs, their task when making such decisions is fairly straightforward. However, the desired state of conservation in the economy, while conceptually well-defined, is difficult, if not impossible, to determine in the real world — public conservation efforts involve costs and benefits which may not be readily assessed in dollar terms. For example, what is the ultimate value of a nation's energy self-sufficiency, or of the enjoyment received from an extra day's vacation bought with the money saved in driving a more efficient automobile?

Appropriate levels of public investment in conservation can in theory be determined by evaluating social net benefits but, in practice, this will be difficult. Although in principle the conservation objective is to increase total social net benefits, in practice we cannot know with certainty whether this is being achieved. There are nonetheless some practical guiding principles in formulating resource use policies. For renewable resources these include measures to prevent wastage, environmental damage and irreversible declines in resource flow rates. For nonrenewable resources, conservation objectives include rational rates of use and the discovery and development of efficient energy technologies and alternatives.

By influencing economic forces, governments may indirectly change the schedule of resource use rates over time to induce conservation. Direct intervention by the state may be necessary to achieve certain conservation goals. Direct tools include education in and regulation of use. Public education can be particularly effective in reforming habit patterns to make them conducive to energy conservation. Regulation of conventional energy use can also encourage conservation, minimum performance standards for automobiles being one example.

As individuals we will often make conservation decisions based on our incomes. One individual may choose to spend part of a week's wages on gasoline for a weekend jaunt while another person may receive more satisfaction from spending the money to improve the insulation in his home. As a society we will make conservation decisions based on the disposition of national income, relative to energy and all other goods and services.

Conservation decisions are predicated on our concern for the long-term viability of our economy and the welfare of future generations. Conservation of exhaustible energy resources will assure us of continuing supplies for years to come. Having conventional sources of energy in the year 2010 may be important if being without sufficient alternatives at that time would mean

the deterioration of our economy and way of life. Conserving exhaustible sources of energy for the future is thus a form of insurance against unforeseen problems and events. It does not remove the need for effective, affordable alternatives.

#### **4. PRICING CRITERIA FOR ALTERNATIVE ENERGY AND OIL SUBSTITUTES**

The prices of the major conventional energy resources in Canada — oil, gas, coal and primary electricity — are regulated and therefore largely determined by government policy. We present the argument elsewhere in this Report that the true cost to Canadians of conventional energy is implicitly the world price and that we pay the difference in taxes, foregone oil revenue, and net income and production losses.

Determining the true cost of conventional energy in Canada is, as with all energy matters, complex. How can one then expect to determine the price of alternative energy, which for the most part will be supplied by technologies not yet in place and for which structured markets are only beginning to emerge? Fortunately, there are some methods by which the price of substitutes can be estimated. As a general rule, we may expect that energy alternatives will enter the system at prices which approximate those of conventional forms for given uses. The relevant value of each new unit of energy, however, is its replacement cost. What will the prices of alternative energy forms be in the long run? In a purely competitive market we would expect the price of a good to be based on its long-run cost of production. In practice, in real world energy markets beset by market imperfections, by economic power concentrations and by government intervention, energy prices will only crudely reflect changes in the long-run cost per unit.

Since time and future prices are factors in determining the role of alternative energy forms and the appropriate pricing of conventional forms, alternative energy sources cannot be properly assessed by considering only present circumstances. The pricing of energy over time should be related to the long-term value of the resource. Views of what the best pricing schedule is will vary considerably depending upon the perspective of the person or group making the decision.

Consider the Organization of Petroleum Exporting Countries, an influential body in oil supply and pricing on a world scale. It is advantageous for the OPEC nations to act in concert and price their oil in order to get the most return from their total resource. They manipulate supply in order to influence demand and price. By restricting supply the OPEC countries achieve two economic objectives (not to mention a few political ones):