Chapter 17

ENERGY, AND ITS USES

The First World, with around 30% of global population, consumes 80% of all energy today. Over 2bn world citizens depend on rapidly diminishing supplies of firewood as their primary source of energy. They are denied any possibility of enjoying all the various uses of electricity which the rich world takes totally for granted: lighting, heating, cooking, washing machines, refrigerators, televisions, vacuum cleaners and all the numerous other household aids. If there is no firewood to be found, even after many daily hours searching, and they are able to obtain modest amounts of crude kerosene for cooking, the fumes will cause them both lung and eye damage. At the other end of the energy use scale, profligate consumption of many tons of high grade aviation fuel takes place every minute of every day throughout the rich world as 'Jumbo' jet planes struggle to get airborne with their massive loads.

In common with so many other valuable resources, the world's stocks of non-renewable fossil fuels are being exhausted at an accelerating rate. Their consumption is all too often governed by barely credible preferences being given to short-term profits. In 1992, for example, the UK government considered it perfectly acceptable for the newly privatised electricity generating companies to change over to burning allegedly 'cheaper', but less plentiful gas, even though the resulting fall in demand for their traditional fuel would mean millions of tons of coal being lost for ever in the abandoned mines.

Throughout the First World, political leaders preside over a headlong rush towards the extinction of basic fuels, without a thought for future generations.

At current, accelerating consumption rates, natural gas and oil are expected to last around 50 years and 30 years respectively.

Therefore the final exhaustion of these prized and versatile fuels will occur around 2025. We have seen in Chapter 4 that the various environmental disasters including soil erosion, forest destruction and climatic deterioration will also reach ultimate crisis levels at around the same period. Thus during the remainder of the 20th century, and the first quarter of the 21st, mankind faces a whole series of doomsday scenarios, unless urgent action is taken to reverse them. Further, although coal resources are currently expected to last some 200 years, once oil and gas have gone that expectancy could well be greatly reduced.

Alternative energy policies

There are three distinct priorities for energy conservation and use: first, the necessity to treat the remaining reserves of fossil fuels with the greatest care; second, to maximise efficiency in the use of all forms of energy, world-wide; third, to promote the development and use of all possible alternatives, and so far as possible renewable forms of energy. In Chapter 16 we have already seen the need for a significant reduction in the waste of resources involved in the manufacture of certain road vehicles. Because of the urgency, also, of reducing fuel consumption, Alternative World would immediately cease further manufacture of cars and heavy lorries, and withdraw the maximum number as early as possible from the roads (see Chapter 18). Oil fuel would remain available for medium and large passenger vehicles, local goods delivery, farm tractors and mechanical plant for housing and other essential building and civil engineering works, such as irrigation. However, even those vital activities could not depend on oil fuel supplies indefinitely, and a start would need to be made on developing alternative energy sources or technologies for them.

In common with all the other fields of endeavour, the elimination of the restraints of the money system would open the door for the most rewarding approaches to the problems of energy. Private profit interest would no longer exist to compromise promising developments, such as restricting the development of hydrogen as a fuel by the oil companies. Every needed resource world-wide would be applied to make suitable and adequate energy available to mankind everywhere. The world forum of representatives would prepare a global energy plan for ratification by all the regions, and thereafter adoption would be mandatory. The plan would first ensure that the remaining supplies of all three of the main fossil fuels would be shared out equally, world-wide. Because regular energy transfers over long distances tend to be wasteful, the plan would aim at regional energy self-sufficiency wherever possible, with mutual assistance when necessary.

Energy use efficiency

One estimate of over-all global energy conversion efficiency has suggested a figure as low as 6% to 8%, with an absolute maximum of 20% after taking account of such factors as friction, heat losses, wear, malfunction, poor fuel oxydisation, transmission losses, overloading and inadequate insulation.10 Whatever the actual figure may be, the scope for improvement is clearly enormous. Studies have shown that, simply by applying already known technologies, efficiency world-wide could well be increased by at least 30%, leading to commensurate energy savings. An authoritative US study in 1989 showed that improving efficiency nationwide could be 7 times more cost effective than introducing nuclear generation. Very large, widely separated generating stations,which result in serious transmission losses even at very high voltage, indicate the desirability of smaller-scale, localised generation, using whatever energy source is appropriate.

Alternative World would promote the widest possible application of ‘CHP’, or combined heat and power schemes which have already proved their value in many locations. CHP makes use of the otherwise wasted exhaust heat from fuel-fired generating stations by means of ‘district heating’ systems piped around neighbouring housing or industrial estates. This technology can double efficiency; if used more widely in the UK, for instance, annual savings of around 30m tons of coal could result. The most dramatic energy savings could naturally be obtained by eliminating altogether such inefficient users as cars and heavy lorries. Similarly, significant savings could be made in hot climate areas by eliminating air-conditioners. The gross inefficiency of this technology is underlined by the fact that it absorbs five times more energy to lower air temperature by one degree than it does to raise it by one degree. In the US and Japan, for instance, peak electricity loads are determined by air-conditioning demand. Since prior to the 20th century all societies managed their lives without air-conditioning, and most still do, Alternative World would not permit its use except for hospitals and other genuinely special cases. Dramatic energy savings could also be made by curtailing night-long lighting of streets and other forms of unnecessary illumination.

Freed from the inhibitions of ‘budget restrictions’ and the like, it would be possible to devote all necessary resources to exploiting the the tremendous opportunities for greater efficiency in almost every sphere of energy use. Alternative World would ensure that, in cold climates, both new and existing buildings included the best possible standards of thermal insulation. Since compact fluorescent tubes use only 20% of the energy required by conventional bulbs for equivalent lighting, and last around 12 times longer, their use would be introduced everywhere, both in new and existing buildings.

Items of household electrical equipment offer scope for energy efficiency improvements; it has been estimated that if low-quality refrigerators were replaced throughout

the US, the output of some twenty generating stations could be saved. Similarly, the efficiency of electric motors, with such a vast variety of applications, could in many cases be improved.

Both through greater efficiency,and through elimination of wasteful usage, mostly in the rich world, as outlined above, the net energy gains to the world would be huge, if incalculable.

To those gains would be added the enormous energy savings which would follow the elimination of both the manufacture of weaponry, and the wasteful use of fuel by armed forces everywhere. The combination of these two totals would represent a formidable proportion of existing world energy use. That grand total of presently wasted energy could be diverted, and used in the best possible way by bringing living conditions in the present Third World up to acceptable standards, without seriously encroaching further on existing world energy stocks

Renewable energy sources

Very shortly, when oil and natural gas are gone, and before long, when coal too is gone, the world will have no choice but to exploit alternative, renewable sources of energy.

Alternative World's master energy plan would give high priority to both developing existing technologies further, and to researching all possible new ones. Once 'levelling-up' had been achieved by the transfer of necessary resources including energy, from North to South, the world could face its energy future on a fairly equal footing. Fortunately, largely because all renewable energy derives in different ways from the sun, opportunities for exploiting that energy are reasonably evenly spread around the globe. For example, very broadly, the greater availability of solar heat in equatorial regions could be said to be balanced by the greater possibilities for hydro- or wind-power in Northern or Southern regions.

Renewable energy sources can be divided into two categories. 'Primaries' can be defined as those which require initial construction of necessary installations such as solar panels, but subsequently continue to function indefinitely by natural processes. 'Secondaries' can be defined as those which, besides initial installations, require various additives to supplement natural processes. 'Primary' sources may be subdivided into those involving water, wind, the sun and other forms of heat.

Hydro-electric schemes already produce around 25% of all power produced globally. Reference was made in Chapter 4 to the highly harmful environmental effects of many of the world's huge new dams. Unless it could be established beyond doubt that no ecological damage would result, Alternative World would put a stop to such developments. Instead, efforts would be concentrated on medium-sized and small 'run of the river' dams which could supply local communities and reduce transmission losses.

Power generated by turbines within estuary barrages, driven by the rising and falling tides, have been proved in a number of examples world-wide to be technically satisfactory. However, as with massive dams, it would always be necessary for possible harmful ecological side-effects to be taken into consideration.

In line with all the other possibilities for producing energy, all necessary resources would be provided to promote wave-power generation, particularly by building full-sized trial installations. One of the many possible types was designed and described, by Professor Salter of Edinburgh: 'Nodding "ducks" would float in long lines absorbing over 80% of wave energy. Free-floating, they would slowly drift towards shore, while using their generated power to electrolyse water and thus produce hydrogen. At a convenient point most of the hydrogen would be taken off for use as fuel in various

ways, and the balance used to tow the line of ducks out to sea to start the process again.'[11]

Wind as an energy source is unique in being available world-wide, night and day, and in overcast conditions. However, its main compromising feature, intermittence, has to be taken into account. Since in Alternative World all resources would be owned in common, it would be vastly easier to both integrate wind generation with other forms, and to provide various means of storing wind energy for use during calm conditions. Great emphasis would be placed on research to improve and extend such storage technologies, which currently include pumped water, flywheels, compressed air, batteries and hydrogen. It has been estimated that 100,000 well-dispersed, large wind generators could supply all Europe; California expects shortly to meet 10% of demand from wind power. Research would also be focused on the aesthetic aspects, to make future, necessarily prominent but essential 'wind farms' as visually acceptable as possible.

Solar energy absorbed by the earth annually, approximates to 20 times the energy value of all the world's existing fossil fuel reserves yet at present we fail to use more than 0.5% of that potential. An important contributing factor to that failure has been the selfish, profit-guarding behaviour of the money system: 'When the solar-cell industry began to flourish during the 1970s, the world's major oil conglomerates lobbied strongly against it. They then proceeded to buy out most of the independent producers and research and development organisations. By 1983, the four largest photovoltaic manufacturers, which commanded half the global market, were wholly owned by major oil companies.'[12] Once Alternative World had 'freed up' man's natural inventiveness, a vast range of possibilities would open up for solar energy. At one end of the scale, large installations could generate electricity for distribution, as a few already do. A Japanese estimate has suggested that around 300 square miles of solar cells, sited in deserts, could produce as much power as is currently consumed world-wide. At a more modest level, photovoltaic cells, such as those used on spacecraft, could produce instant electricity for domestic cooking, refrigeration and stored energy for lighting.

Such a technology would have obvious application in the present Third World, and would represent a simple, yet tremendously welcome, resource which could be readily transferred from North to South once Alternative World had been established. Apart from the humanitarian impact, such a transfer could put an early end to the present appalling destruction of the earth caused by the incessant, desperate search for firewood.

The geothermal energy in the upper 5km of the earth's crust is equivalent to 40m times that in the world's oil and gas reserves. It can be used to produce heat or power. Either subterranean hot water is pumped up or natural steam can drive turbines. Man-made steam is produced by drilling into hot rocks and pumping in water which emerges as steam from other boreholes.[12] Currently only 0.1% of the world's energy needs are met in these ways, so the opportunities for research and development are clear.

Several 'secondary' renewable energy sources could well be developed further, particularly by minimising the amounts of 'top-up' energy needed to supplement the natural processes involved. Hydrogen is a particularly promising, clean fuel, simply produced from the reaction between electricity and water, but requires further research particularly in relation to the bulk of the tanks required. 'Green' fuels have been developed from various crops; so far petrol solvents, diesel oil, and lubricants have been derived from sugar beet, vegetable oils, straw and oilseed rape.[13] Alternative World scientists and representatives would need to weigh carefully the pros and cons of using potentially food-producing land for fuel production.

Every effort would be made in Alternative World to keep waste of all kinds to the

absolute minimum. Whatever domestic, industrial or agricultural waste proved to be totally unavoidable, would all be put to the best possible use in some form as fuel. Again, unconstrained research and development would undoubtedly produce solutions beyond those already proven.

Methane is a valuable gas produced from most decomposing processes, and can be used at high efficiency in specially designed engines. In fact, in 1990, the US was producing more power from biogeneration than from nuclear energy.[14]